THE IRON TRADE REVIEW

VOLUME XXIV. CLEVELAND, O., JUNE 18, 1891. NUMBER 25.

THE IRON TRADE REVIEW.

A JOURNAL OF THE
IRON AND STEEL INDUSTRY, THE MACHINERY TRADE AND KINDRED INTERESTS
IS PUBLISHED EVERY THURSDAY BY THE
CLEVELAND PRINTING AND PUBLISHING CO.,
27, 29 *and* 31 *Vincent Street, Cleveland, Ohio.*

TERMS, (strictly in advance):

One year	$3 00
Six months	1 50
Three months	75

Advertising Rates Furnished on Application.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER.

CLEVELAND, O., JUNE 18, 1891.

THE WEEK IN IRON CIRCLES.

General Features. The financial situation still continues to be the center of interest. Secretary Foster, in a recent address at Brooklyn, said that the present gold shipments did not disturb him in the least, and that this is probably the only country in the world that is sound financially. It is certain that his visit to the East has been productive of excellent results in inspiring renewed confidence in the future, but, outside of Eastern money centers it is equally certain that the money market is growing a little closer each day. Hopes for the future are based on good crops, which now seem assured, but for the present close management must be the order of the day. Although this is the beginning of the usual period of midsummer dullness, the work has shown a fair degree of activity in pig iron circles. For some time past, consumers have been trying to induce furnaces to accept orders for delivery during the year at current prices, but the feeling among producers has been that the conditions of trade could not be worse, and would probably be better, so they have sold only for early shipment. The impression seems to be gaining ground, that we are not likely to see anything in the nature of a boom, and sales are now confirmed by the furnaces for the whole year's delivery, that would not have been accepted a month ago. The latest reports show a slight increase of Southern coke iron, while the total stocks in the country were largely reduced during May. At Cincinnati a few orders for car wheel irons have excited very close competition, and the fact is developed that some of the Southern and Lake Superior charcoal furnaces are making extremely low prices. The Louisville market continued dull during the first part of the past week, but towards the close inquiries were more numerous and resulted in some sales. Rolling mills report that there is an increased inquiry for iron, and that parties who have been trying to purchase, at other points, finished material at the exceedingly low prices that have prevailed have found it not easily done. All have been disappointed that the buying on the part of railroad companies has not developed. The only reason offered for the slackness of orders from railroads now that they have such heavy tonnage promised, is that they have not the money to pay for cars at the present time, owing to the heavy decline in railroad securities. Iron is being offered at basis of $10, for grey forge, both for immediate and for delivery throughout the year, though the leading companies are asking 25 cents more, there seems to be plenty of cheap iron to supply present needs. Some good-sized orders have been placed in the Chicago market during the past week for Southern coke iron, these being for long scattered deliveries. Low prices have been made, indicating that some of the Southern furnaces are in need of additional orders to prevent an accumulation of stocks. A moderate amount of general business is going, but the volume is much smaller than during last month. Prices remain about as reported a week ago, though on Southern coke irons more of a disposition exists to shade figures for desirable parties. Our Buffalo correspondent notes the fact that as yet there has been hardly time to feel the effects of the recent blowing in of several of the Valley furnaces. Whether the additional production will at this time create an excess over consumption remains to be seen. It is very doubtful if prices will decline further, as they have so long remained low, anticipating the present situation. There has been a fair amount of buying during the past week, at Louisville. Although there have been no large orders, they have that appearance when compared with the purchases for some time past. Buyers still adhere to the principle of buying simply to cover actual wants, and think there is nothing to be gained by buying ahead. Sales have mostly run in the line of charcoal metals. While nearly every branch of the iron business at Detroit looks decidedly brighter and more brisk in every direction, there is no actual change in prices. The purchasing of ore, the termination of the coke strike, the inquiry for cars, all lead to a large inquiry for pig iron, and also some actual transactions of considerable magnitude, particularly for Lake Superior charcoal iron for car wheel purposes, have been made.

The Local Situation. Very little can be said of the market in general except that the signs of an impending change are not wanting, although no one seems to be able to make much of a forecast of the coming events. The only thing that may be stated with any degree of certainty is the fact that no two men in the business can be found to agree upon any one question affecting both, either of fact or of speculation. Among the ore men no less than among the makers of pig iron every shade of opinion can be found, embracing every hue of possibility, from a deep and gloomy black to a luminous, bright chrome. Yet, after all, it is not going much out of the way to state that the prevailing color is in the latter direction, and that the kaleidoscope is turning in the direction of the roseate. There are ore men who do not want to sell their possible output, because, as they say, there is no use giving it all away when there is more than a probability of getting better prices later on, and, moreover, because large sales, at the ruling low prices, would simply mean the impairment of their working capital, the mine, without any adequate return. Then, again, there are those who, having settled the question among themselves whether or not they meant to be "in it," have resolved to be in the procession, if only to keep their trade. One such firm, that has found that by selling a hundred thousand tons of ore they would lose money where they would make a small profit by selling four times that amount, has gone into market, cut its price until nothing remains of it but rags and tatters, and is bidding for business, while another firm, quite similarly situated, is holding off, preferring the advance that some are hoping to realize later on. Those who, having materially cut down their output of ore, are not immediately affected, and are therefore no factors in the market, all hold to the latter opinion. Almost every ore firm reports a number of similar sales, at the old price made a month ago, Quite a good deal of Chapin is sold, more than three hundred thousand tons, and some of it at four dollars. The sales at Ashland are also quite large, the probable output falling but slightly behind last year's production. It is a notable fact, however, that those Mahoning Valley furnaces that have started up, are by no means fully supplied with Bessemer stocks, while they all report full purchases of other grades of ore. The furnaces are getting all the coke they need, but there is a dearth of ore, owing to the prolonged dock strikes. The pig iron market, although void of improvement in the way of better quotations, is quite firm, and the quantity of iron for sale for future delivery is getting scarcer from day to day, which is a very good sign. The inquiries for iron of all makes is rather lively, and at this rate the chances are more than good for a stiffening in the price. The local dock strike, which was thought to be about settled, has broken out afresh, and at the hour of going to press the harbor is choked with boats, most of them waiting to be unloaded, and a few with half cargoes. The question of pay was left by both sides to arbitration, with the result that the arbiters settled upon a twenty per cent. reduction as equitable. The dockmen declined to accept this result, however, and unless they return to work by the end of the week, new men will take their places. Even after work begins in earnest, from three to four weeks will be required to get the boats into regular running order.

"UNBLUSHING IMPUDENCE" OF AMERICAN MANUFACTURERS.

Our excellent contemporary, the *European Trade Mail*, of London, after having satisfied itself that the claims of superior workmanship by American artisans are "as utterly baseless as they are unblushingly impudent," and having expressed the confident belief that Great Britain has "no fear for the future" in respect to the superiority of her mechanical products, proceeds to give the whole thing away, by urging British manufacturers, if they would retain and extend their foreign trade, to "use greater vigilance," and it quotes from a contemporary to the effect that complaints are made of the difficulty of obtaining from British engineers machinery and tools specially adapted to the acquirement of foreign buyers. For instance, it is pointed out that "in the United States the tools generally used for screwing pipes—cutting a full thread—at one operation enable the work to be done quicker, better and cheaper than with the old English dies. Yet it is comparatively recently that in England these tools have obtained a footing, and that only in establishments where good work is the first consideration." That hardly looks as if American-designed tools were so inferior to the English article as to make comparisons "unblushingly impudent." Indeed, our English contemporary still further eats its own words by declaring that, what British "manufacturing engineers and patentees have to do is to devise a new class of machinery." "Our laundry engineers, for instance," it says, "could, by making a few alterations, and adopting one or two improvements, supply small machine ironers and calenders that would find a ready sale, not only in Spain, but in many other districts of the continent, and they would also have a better chance of meeting their American competitors on a more level field of action in our colonies than is now open to them." What need is there in making alterations or adding improvements to meet American competition, if the claim of superiority on the part of American manufacturers is "unblushingly impudent?" "The fact is," says the *Mail*, in conclusion, "engineering firms looking for patronage abroad must not be afraid to spend money in a proper and legitimate direction. To secure, and keep, the foreign markets, engineers must show themselves willing to meet, if not anxious to forestall the wishes of their customers." We had thought of answering the *Mail's* absurd braggadocio, but, on the whole, it has occurred to us that it is best answered by its own admissions.

A THREAT TO LEGITIMATE BUSINESS.

We invite attention to the strongly condemnatory article from the *Colliery Guardian*, of London, in another column, concerning the present speculative craze in the English iron markets. As might be expected, the whole trouble lies in the fact that the pig iron warrant system affords a convenient and tempting device for speculation, which unscrupulous persons are not slow to detect and seize upon to accomplish their ends. That so staid and conservative a journal as the *Guardian* should declare that the warrant market, during the past two months, "has been made the sport incontrovertibly of gamblers pure and simple, who have not a fraction of real interest in the trade itself," is one of the logical sequences of the system, which we have frequently pointed out. That it has shown itself to be "an unmitigated evil, and has worked incalculable injury to the [iron] trade at large," is the deliberate judgment of a careful and representative trade journal. That not only the pig iron trade, but all other departments of iron and steel production have felt the baneful effects of the warrant speculation is a fact that deserves careful consideration on this side of the Atlantic, where the experiment is being forced upon American iron men. As repeatedly pointed out by *The Iron Trade Review*, whatever the advantages of the warrant system, its aims, objects, and results are to place the trade in the hands of designing schemers, whose ignorance of the business is only equaled by their inherent unscrupulousness. America has room for a great many things, but it has no use for the warrant speculation scheme.

NATURAL GAS DEVELOPMENTS.

A survey of the natural gas field shows some recent developments of interest to manufacturers. Canada is coming forward rapidly as a natural gas territory, a 15,000,000-foot well having recently been struck at Sherkton, Ont. It is owned by Buffalo parties and the gas will be piped to that city. In Ohio, the known field is gradually being extended. At Barnesville, a 1,000,000-foot well has been struck at a depth of 1,700 feet. Toledo manufacturers are congratulating themselves upon the discovery that they are nearer the natural gas belt than they supposed. A well recently put down in East Toledo turns out to have a pressure of 400,000 feet. Considerable activity is noted in the South, a fair strike of gas at Tallahoma, Ala., having recently been announced. Continued strikes in Indiana are reported. A well recently put down at Anderson, Ind., for the Anderson Rolling Mill Company, is rated at 8,000,000 to 10,000,000 feet. A new well, said to be of largest capacity, has recently been drilled at Dunkirk, Ind. The Pennsylvania field, contrary to general impression, is increasing in the amount of known territory, and new towns are being constantly added to the list of consumers. A charter has just been granted the Natural Gas Company to supply the towns of Butler, Greenville, New Castle, Franklin, Meadville, Oil City, Erie, Grove City, Warren and Conneautville. Altogether, the present outlook for the natural gas industry is far from discouraging.

AGAIN has the *Un-American Artisan* been brought to book by an indignant subscriber for its absurd course on the tinplate question. The subscriber in question does not mince matters, but says that it appears to him that the *Artisan* "seems to be in full sympathy with the English tinplate manufacturers." Certainly its course would seem to give color to this charge, and, in view of all that has appeared in its columns its defense, that it is only fighting illegitimate tinplate enterprises, is enough to provoke a smile. The *Artisan* is nothing if not hidebound on the tinplate question. Its cause is in marked contrast to that of the *Metal Worker* and *Hardware*, which papers have made it their business to print the facts, without bias or partisan rancor.

CLEVELAND manufacturers are rapidly pushing for larger fields. The most recent illustrations are the contracts awarded Cleveland shipyards for important Government work, and the choice of a Cleveland concern to erect the first of the eleven great buildings for the Columbian Exposition.

STEEL AT DIFFERENT TEMPERATURES AND AFTER USE.

At the May meeting of the Western Railway Club there was a short topical discussion on the behavior of steel in service, of which an abstract follows:

Mr. Barr—A few days ago, Mr. Blackwell showed me a piece of steel, one end of which was bent cold and the other end bent while it was heated to the blue temperature of steel, which is about 700°. The part that was bent cold was bent very nicely—didn't show any defects at all. The part that was bent at a blue heat cracked very badly. I was so much interested in this, and thought it was such an important point, that I had a half dozen pieces made and sent around to all my boiler-shop foremen who did flanging, in order to give them an object lesson on the importance to having a proper heat on their steel. Every piece showed precisely the same thing—that is the end that was bent cold bent all right, and the other end, sometimes before it was bent at much more than a right angle, half broke in two. As I understand the matter, the blue heat is considered by those who are experts in steel working as the most critical, but I am under the impression that all the way from a red heat down to this blue heat you gradually increase in the liability to crack, while from the blue heat down to the cold heat you gradually decrease in the liability to damage the steel. I intend to adopt, as a rigid regulation on my road, that under no circumstances shall a steel sheet be bent unless it is either cold or red hot.

Mr. Gibbs—Mr. Forsyth, I think, at the last meeting mentioned the fact that the steel boiler sheets increased in carbon in service. Formerly, I didn't think that was so, but I have lately seen several instances where it must be so. We had recently a cracked firebox sheet, and we had an analysis and a physical test of it made. The tensile strength had increased about 3,000 pounds say from 53 000 to 56,000, and the elongation reduced from 30 to 22 per cent.—in other words, 8 per cent. in elongation was lost. The elongation had lost very much more in proportion than the tensile strength had increased. The analysis of the sheet showed that the carbon had undoubtedly increased. The other ingredients had not apparently increased. I don't know at this time how to explain the great reduction in ductility, nor the small increase of tensile strength by the increase of carbon alone. The sulphur was not increased.

Mr. Rhodes—This point is interesting, inasmuch as it to some extent accounts for the specifications which railroads make for their steel. Our practice for some little time past has been to require our steel to stand a tensile strain of 55,000 pounds, with a percentage of stretch in 14 inches of, I think, 27. Less than 25 per cent. of stretch we do not accept. We reject anything that exceeds 60,000 or less than 50,000 pounds tensile strength; but we would prefer the tensile strength to be below 55,000 rather than above. The reason is that we have found the same thing that Mr. Gibbs has, that our sheets increase in tensile strength with service, and diminish in elongation. I have recently learned that some Eastern lines have as high a tensile strength as 65,000 pounds, and are thinking of increasing even that. Now, it seems a little strange there should be this different practice.

THE heaviest boilers that have ever been built in Pittsburgh, if not in the entire country, are a battery of seven submerged flue boilers that are being built by a Pittsburgh firm for a large steel works in West Superior, Wis. Each of these boilers is 10 feet in diameter and 30 feet long, made of 1-inch steel, and containing 236 4-inch flues, 20 feet long. These boilers weigh 40 tons each, and will have to be transported upon cars built especially for the purpose.

CONDITION OF THE BLAST FURNACES OF THE UNITED STATES.

June 1, 1891.

[CONDENSED FROM THE AMERICAN MANUFACTURER.]

LOCATION OF FURNACES.	CHARCOAL.					BITUMINOUS OR COKE.				
	Total No. of Stacks.	In Blast.		Out of Bl'st.		Total No. of Stacks.	In Blast.		Out of Bl'st.	
		No.	Week'y capac-ity.	No.	Week'y capac-ity.		No.	Week'y capac-ity.	No.	Week'y capac-ity.
New England	13	5	428	8	684					
New York	9	1	100	8	1,053	6	4	3,724	2	1,601
Pennsylvania	14	1	85	13	1,034	1	0	0	1	600
Upper Susquehanna Valley										
Pittsburgh						25	22	29,188	3	3,478
Spiegel						1	1	830	0	0
Allegheny Valley						1	0	0	1	930
Shenango Valley						17	5	5,005	12	8,129
Youghiogheny Valley						4	1	1,060	3	1,778
Juniata and Conemaugh Valleys						20	8	3,944	12	5,728
Maryland	8	3	280	5	450	3	1	1,411	2	1,487
Virginia	8	2	86	6	428	14	11	6,545	3	801
North Carolina						1	1	100	0	0
West Virginia	2	0	0	2	130	6	1	1,080	5	2,525
Ohio—Mahoning Valley						15	5	4,090	10	8,645
Eastern, Central and Northern						17	10	8,100	7	4,938
Hocking Valley						14	3	1,224	11	2,968
Hanging Rock	12	4	356	8	786	14	10	2,125	4	740
Miscellaneous										
Kentucky	1	1	105	0	0	5	2	531	3	957
Hanging Rock										
Western Region and Miscellan'ous										
Tennessee	6	4	1,021	2	160	13	9	4,824	4	1,538
Georgia	4	1	250	3	379	2	1	800	1	675
Alabama	14	6	1,533	8	1,674	38	23	15,909	15	9,804
Indiana						2	1	156	1	278
Illinois						16	6	7,446	10	10,286
Spiegel										
Michigan	23	11	3,747	12	3,556					
Wisconsin	5	3	1,600	2	397	4	1	940	3	1,935
Minnesota						1	0	0	1	140
Missouri	2	1	250	1	315	5	0	0	5	3,764
Texas	3	3	841	0	0					
Oregon	1	1	280	0	0					
Colorado						2	1	486	1	350
Utah										
Washington	1	0	0	1	205					
Total charcoal and coke	126	47	11,142	79	11,251	247	127	99,419	120	84,076
Total anthracite	160	93	37,238	67	21,591					

SUMMARY.

FUEL.	In Blast. Number.			In Blast. Weekly Capacity.			Out of Blast. Number.		Out of Blast. Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	47	38	58	11,142	9,218	13,001	79	89	11,251	12,669
Anthracite	93	93	118	37,338	37,026	45,132	67	68	21,591	22,087
Bituminous	127	100	164	99,419	70,342	123,820	120	144	84,076	98,536
Total	267	231	336	147,799	116,586	181,953	261	300	116,638	133,292

The True Status of the Great Cities.

The proper way in which to consider the size of a city is to include all the people within radius who are directly dependent upon it for support, whether they may live in a different county or State. The application of this test causes considerable shifting about of places among our cities, and results in some surprises. It gives to New York that great lead in population which her commercial and financial importance and metropolitan character warrant. While on the face of the census New York has 1,513,000 and Chicago 1,099,000, the difference does not seem great, yet, when New York takes all her suburbs and outlying town, places in which people can sleep, but live in New York, she expands into a mighty volume, comparing well with that of London. By taking a section of country around New York Bay about 50 miles square, one obtains a population 3,621,578, all of whom are virtually citizens of the metropolis. By assigning to them areas similar to those given to New York, the chief centers of population are in order as follows:

	Population.		Population.
New York	3,621,000	Buffalo	385,000
Philadelphia	1,422,000	Minneapolis	381,000
Boston	1,334,000	San Francisco	335,000
Chicago	1,324,000	Detroit	330,000
Pittsburgh	677,000	Milwaukee	320,000
St. Louis	629,000	Kansas City	306,000
Cincinnati	593,000	Albany	289,000
Baltimore	586,000	New Orleans	280,000
Providence	532,000	Louisville	277,000
Cleveland	426,000		

—[Courier Journal.

Remarkable Steel Plates.

Messrs. David Colville & Sons, Dalzell Steel & Iron Works, Motherwell, have a very striking exhibit at the Naval Exhibition in London. The exhibit consists of three large boiler plates, one 42 ft. by 78 in. by 1¼ in., and one 45 ft. by 54 in. by 1½ in.; and two large four-furnace marine boiler end fronts for boiler 16 ft. in diameter, flanged by hydraulic pressure, one with the new type of Admiralty manholes flanged and faced out of the solid. The firm also shows a few sections of rolled bars, of which it rolls over 1,000 different shapes and sizes. In the large mills at the Dalzell Works the requirements of the largest boilers are met. To illustrate the ductility of steel, a large number of cold bent and twisted tests are shown, similar to those made by Lloyd's and Board of Trade inspectors during their survey of material at the works. A comparative test of steel *versus* iron is shown, the result of exploding on the surface of both plates identically the same weight of dynamite under exactly the same conditions, resulting in the iron plate being blown to pieces, while the steel plate is only dinged in several inches, but still left intact.—[Iron and Coal Trades Review (London).

THE FIRST IRON BLAST FURNACES IN AMERICA.—II.

BY W. H. ADAMS, M. E., NEW YORK CITY.*

Germanna is now but a name, and scarcely even a name, if modern maps be taken as sole authority. Originally it was the center of a royal grant of 194,000 (now reduced to less than 1,000) acres. Its well-tilled fields lie snugly within the sheltering embrace of the highlands on three sides, and almost surrounded by the sparkling waters of the Rapidan river.

The fort which stood for so many years the frontier bulwark of civilization in Northern Virginia, protecting with its guns the rope-ferry or the later bridge and landing, and connected by an underground tunnel with the governor's mansion, has disappeared. Its very site must be guessed at in the ploughed fields which have taken its place. The "enchanted castle" itself, a marvel of comfort, and elegance to the travelers of those days (whose enthusiastic accounts of it emphasize also its presiding mistress, the charming wife of the governor), was long ago wasted by fire and decay. Its materials, even, have been scattered. The court-house, so long the seat of government of this vast domain, the dwellings, storehouses, mills and shops, are all things of a past time.

One object, famous in story and song, can be seen to-day, as it was seen of old by pilgrims from far and near—the "Fountain Spring," flowing clear, cold, and abundant from a cleft in the greenstone, through a lining and into a basin composed of the clearest quartz, the purity of which gave rise to the statement that "in his extravagance, the governor even imported marble for his fountain spring." The are also some interesting relics, such as a sideboard, table, clock, portraits, etc., preserved from the fire which destroyed the governor's household, and now the property of his direct descendant, Alexander Spotswood, Esq., who lives within a few miles of Germanna.

On lands now belonging to Benjamin Sisson, Esq., several miles higher up stream, there are a few evidences of a mill and dam erected by the Palatines. Moreover, some incomplete records still exist of the business done at the town in the sale of "fire-backs," etc., and there are several of the cast-iron articles which came from the foundries, or air-furnaces, in the region; but nearly all of the best work done by these Germans must have been lost or destroyed in the changes of the century since the Revolution, or is at present in the hands of collectors.

The immediate neighorhood was the rendezvous for Indian tribes, as, in addition to the minerals and earths obtainable here for their utensils, weapons and paints, there was the best of fishing at all seasons, and the locality was specially favorable for the curing of fish and game. This may have had something to do with the location here of a trading-post in 1670, and a fortified station for military operations in 1676, and the actual settlement of the town-site by Governor Spotswood, in 1712-14, in a position midway between the two well-known agricultural and mineral sections of this newly-opened territory.

It was not difficult to fix the localities of the furnaces which Col. Byrd describes, with more or less detail, as already in operation. These points, as shown on the sketch, I have verified at different times, by following the routes given by Col. Byrd, and examining the outcrops of the mineral belt. That the furnace-sites were evidently chosen with deliberation and with knowledge of all requirements, must be conceded after an examination of all the circumstances; and it is certainly remarkable that historical landmarks established with so much intelligence should have been so easily forgotten as to make their past existence, even, a matter of doubt or denial.

From all the data and from close study of the materials in place, I believe the furnaces were erected in the following order: the Rappahannock furnace; the Fredericksville furnace; the Washington-England furnace. In none of the records are more than three blast-furnaces mentioned, and there is no location on the mineral-belt which could have supported other furnaces, during the working period here under consideration. It is true that Governor Spotswood sometime speaks of four furnaces; but all the facts go to prove that he was interested in only the first and second named above, and in one "air furnace," located at the outlet of the Massaponax river, on a neck of land now owned by Dr. Morton. The Massaponax furnace was built by the master-workman who came from England expressly to erect the blast-furnace at Fredericksville, and is known to have been a reverberatory melting-furnace of the long-hearth type so common in Europe at that period, the capacity being about four tons daily output of cast-iron. In later records, mention is made of another air furnace, which was counted as belonging to this section of the country, although, being located on the Maryland side of the Potomac, it was out of the colony of Virginia.

The Rappahannock furnace was erected, without doubt, on the arrival of the Palatines at Germanna. This furnace stood close to the fords of the river, and on the almost precipitous banks of a small stream which was relied on for the necessary power. Considerable grading was done to provide for the operation of the furnace, the storage of charcoal, limestone, ores, etc. Protected by its isolated position, the structures remained in an excellent state of preservation. The furnace is almost intact, its cleanly cut-stone work and auxiliary walls, race and chambers being about as they were left by the last workmen, 160 years ago. A giant black-walnut tree is growing from the mouth of the furnace, binding with its roots the heavy walls in place, and closing every aperature against the ravages of time. The slag-piles, fluxes, coal and considerable amounts of pig iron, found in odd shapes in the cinder beds and the bed of the brook; the dam of generous extent, but faulty construction; the race-way, tail-race, etc., are interesting mute evidences of this early enterprise.

The ore-banks, close at hand, are extensive and might well excite the remarks of Col. Byrd, quoted above.

Only the mines nearest the furnace were used. There are old banks about

*Cleveland Meeting, January, 1891.

the Catherine furnace, in that region; but these have been opened since 1830, to supply that particular plant.

The second furnace was located in an isolated position, off the main lines of travel, about 30 miles from Fredericksburg, 10 miles from the present Mineral City, one-half mile from the North Anna river, and about 20 miles due south of Germanna. The exact site is just off the main county road from Fredericksburg to Mineral City. It has been very interesting to discover the reasons for the choice of such a place, so far from Germanna, and attended with such drawbacks as the high cost of transportation for building materials and for pig iron (marketed, perhaps, hundreds of miles away), and the peril to the lives of the workmen at this exposed outpost. But an examination of the whole mineral belt shows that no other site on the lower end of it would have been equally suitable. Geographically, it is in about the center of the belt, as then already well known, near the North Anna river (which, at that date, must have been a stream of considerable importance), and in close proximity to the best of brown iron ores, which are scattered throughout the primitive rocks of the region. Alongside this outcrop of pure ores, there lies a wide belt of garnetiferous, micaceous and talcose slates. The furnace was placed just at the dividing line between ores and slates, in a gash-seam which supplied sufficient water for all purposes, and which crossed the slates at right angles, opening to the southward toward the river. The dam, built about 1,000 feet above; the race which brought the water down to the furnace, at a level probably 20 feet above the base; the walls of the flume which carried the water to the overshot-wheel, and the site of the blowing apparatus (probably the accordeon type of bellows) are all still to be seen on the spot. Just above the furnace are leveled spaces for the storage of ores, charcoal, fluxes, etc., sufficient for at least 20,000 tons of materials. Still above this level, the ground rises to a height of probably 60 feet, and the ore pits, with samples of the ores used, are easily found for some distance to the southwest.

The casting beds were nearly on the level of the brook, about 50 feet away, and the furnace must have been at least 20 feet high, from its base to the bridge which extended to the bank above.

The slag heaps are some distance away, and contain at least 10,000 tons, possibly double that amount, as they have been in part washed into the brook, overgrown and buried, and it is therefore difficult to estimate their contents closely.

The materials which I have gathered, prove that the furnace actually smelted iron ores, and produced good pig iron; the slags plainly indicate excellent judgment in furnace management, and the quality of the pig iron proves the knowledge of ore mixtures to have been equal to that of the present day in the same district. Ores, fluxes, charcoal, masonry, etc., abound in the great quantity of debris scattered about. Unfortunately, no care has been taken by the owners of the land during the last 20 years for the preservation of the stack itself, or its materials; and at least half its original height has been sacrificed to furnish foundations and chimneys for the cabins of the neighborhood. A few of the bricks (unique in their shape and weight, and evidently brought from some foreign land) are still in the ruins of the furnace; but the choice bricks of the upper part have disappeared. The specimens I have secured were taken some time ago, during a further wrecking of the main structure, and represent a fair average of what now remains, perhaps 10 feet in height. These samples represent the pudding-stone, which made up the body of the furnace, with streaks of slag filling all the joints and seams; the firestones, both sandstone and slate; and the inner and outer bricks, the mortar on which is as firm as when first seasoned, although it has been exposed to weather for 170 years or more.

Col. Byrd in *A Progress to the Mines*, page 49, says of these works:

"I passed the south branch of the Pamunkey river.....after this I had eight miles to Mr. Chiswell's.....I found Mr. Chiswell a sensible, well-bred man, and very frank in communicating his knowledge in the mystery of making iron, wherein he has had long experience. I told him I was coming to spy the land, and inform myself of the expense of carrying on an iron work with effect. That I sought my instruction from him, who understood the whole mystery, having gained full instruction in every part of it; only I was very sorry he had bought that experience so very dear.

"He answered that he would with great sincerity, let me into the little knowledge he had, and so we immediately entered upon the business. He assured me the first step I was to take was to acquaint myself fully with the quantity and quality of my ore. For that reason I ought to keep a good pick-axe man at work a whole year, to search if there be a sufficient quantity, without which it would be a very rash undertaking. That I should also have a skillful person to try the richness of the ore. Nor is it great advantage to have it exceedingly rich, because it then will yield brittle iron, which is not valuable. But the way to have it tough is to mix poor ore and rich together, which makes the poorer sort extremely necessary for the production of the best iron.....He told me after I was certain my ore was good and plentiful enough, my next inquiry ought to be, how far it lies from a stream proper to build a furnace upon, and again, what distance that furnace will be from water carriage; because the charge of carting a great way is very heavy, and eats out a great part of the profit. That this was the misfortune of the mines of Fredericksville, where they were obliged to cart the ore a mile to the furnace, and after 'twas run into iron, to carry that 24 miles, over an uneven road to Rappahannock river, about a mile below Fredericksburg, to a plantation the company rented of Col. Page..... He told me further that 120 slaves, including women, were necessary to carry on the business of an iron work, and the more Virginians among them the better; tho' in that number he comprehended carters, colliers, and those that planted corn. If there should be much carting, it would require 1,600 barrels (8,000 bushels) of corn yearly to support the people and the cattle employed; nor does that quantity suffice at Fredericksville. That if all these circumstances should happily concur, and you could procure honest colliers and firemen, which will be difficult to do, you could easily run 800 tons of sow iron a year. The whole charge of freight, customs, commissions, and other expenses in England, will not exceed 30 shillings a ton, and 'twill commonly sell for £4 10s. So that, allowing the 10 shillings for accidents, you may reasonably expect to clear a profit of £4, which being multiplied by 800, will amount to £3,200 a year to pay you for the land and negroes. But then it behooved me to be fully informed of the whole matter myself, to prevent being imposed upon; and if any offered to put tricks upon me, to punish them as they deserved.

"In the afternoon I walked with my friend to his mill, which is half a mile from his house. It is built upon a rock very firmly, so that it is more apt to suffer by too little water (the run not being over plentiful), than by too much. On the other side of this stream lies several of Colonel Jones' plantations. The poor negroes upon them are a kind of Adamites, very scantily supplied. Close by the furnace stood a very spacious house full of charcoal, holding at least 400 loads, which will be burnt in three months. The fire in the furnace is blown by two mighty pair of bellows, that cost £100 each, and these bellows are moved by a great wheel of 26-foot diameter. The wheel is carried around by a small stream of water, conveyed about 350 yards over land in a trough from a pond made by a wooden dam. Chiswell, the only person with any knowledge, gets £100 a year, and richly deserves it.

"On our return, we saw near the furnace large heaps of mine, with charcoal mixed with it, a stratum of each alternately. To this they put fire, which in a little time spreads through the whole heap and calcines the ore, which afterwards crumbles into small pieces fit for the furnace. There are likewise a mighty quantity of limestone brought from Bristol by way of ballast, at 2s. 6d. a ton, which they are at the trouble to cart hither from the Rappahannock river, but contrive to do it when the carts return from carrying of iron. They put this in the furnace with the iron ore, in the proportion of one ton of stone to 10 of ore, with the design to absorb the sulphur out of the iron, which would otherwise make it brittle. And if that would be the use of it, oyster shell would certainly do as well as limestone, being altogether as strong an alkali, if not stronger.

"The founders who never tried either of these will by no means be persuaded to go out of their way, though the reason of the thing be never so evident. I observed the richer part of the mine to be a dark color, mixed with rust, which was laid in a heap by itself, and so was the poor, which was a liver or brick color.

"The sow iron is in the figure of a half-round, about two feet and a-half long, weighing 60 or 70 pounds, whereof 3,000 pound weights make a cart load drawn by eight oxen, which are commonly shod to save their hoofs. When the furnace blows, it runs about 20 tons of iron a week.

"I took my leave about ten and drove over a spacious level road ten miles to a bridge built over the river Po. Two miles beyond that we passed a plantation belonging to the company, about 500 acres, where they kept a great number of oxen. Three miles further on we came to the Germanna road, then eight miles to the main county road that leads from Fredericksburg to Germanna, which last place I reached in ten miles more."

I have already quoted Colonel Byrd's remarks upon his visit to the Rappahannock furnace, which he left by the main road, over which all the cast iron was carted to the "air furnace" at Massaponax, five miles below Fredericksburg.

Another quotation from him, covering the information which he derived from dwellers in Fredericksburg, concerning the Washington furnace, may conclude this portion of the history:

"On the other side of the river, in King George county, twelve miles from hence is a spring of strong steel water, as good as that at Tunbridge wells. Not far from this spring are England's iron mines, called so from the chief manager of them, though the land belongs to Mr. Washington. These mines are two miles from the furnace, and Mr. Washington raises the ore and carts it thither for 20s. the ton of iron that it yields. The furnace is built on a run, which discharges its waters into the Potomeck. And when the iron is cast, they cart it about six miles to a landing on that river. Besides Mr. Washington and Mr. England, there are several other persons concerned in these works. Matters are very well managed, and no expense is spared to make them profitable, which is not the case in those I have already mentioned. Mr. England can neither read nor write, but without these helps is so well skilled in iron works that he don't only carry on this furnace, but has likewise the chief management of the works at Principio, at the head of the bay, where they have also erected a forge and make very good bar iron."

These interesting proofs of successful iron-smelting at so early a period in the history of the colonies must inure principally to the individual credit of Governor Spotswood, in whom foresight, energy and perseverance were predominant traits.

Among the difficulties which he had to surmount by his personal management, were, for instance, the handling of a colony of dissatisfied foreign workmen, who, allured to America by the promises of De Graffenreidt, found themselves thrown into a wilderness almost unknown and full of dangers; the laying out of roads and the bringing in of supplies; the prospecting for minerals in the yet more remote wilderness; the locating of homes and opening up of agricultural tracts to support increasing immigration; the erection of an entirely new class of furnaces, and the working of these furnaces and the sale of their products, with all the vexing details which are partially made known in the records here presented. What he accomplished in this new field, and under circumstances which seem to us to have been almost impossible; the attention which he attracted, and the reputation which he made among the leading iron-masters of the old world, by the introduction of the "Plantations Pig Iron" into their markets; and the assistance he rendered to all struggling industries, while thus laying the foundation of one of the most important of them all, constitute a title to honorable fame, in the presence of which criticism of his personal ambitions may well find itself disarmed.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

MENOMINEE RANGE.

About 300 tons of ore are shipped each day from the Hamilton, but it is expected that in the course of two weeks, when matters underground shall have assumed a still better appearance, that they will export about 400 tons from No. 1 shaft.—[Iron Range, Iron Mountain.

The Chapin mine is gradually increasing its working force, and about 1,000 men are now employed. During the past week a large block of ore was sold by this mine at $5.50 per ton, and prospects are bright for a steady increase of shipments.—[Florence Mining News, June 13.

It is quite probable that the '91 output of the Monitor will reach above 75,000 tons. The bulk of mining work is in the third and fourth levels. The third level has upwards of 40,000 tons of ore opened and in readiness to mine, all necessary dead work having been done during the Winter months. The same can be said of the fourth level. From this point considerable ore is being raised, mined from two stopes, and two more are being opened. Here the vein shows a width of 100 feet and the ore is of a fine character. The fifth level is being opened and will be 75 feet below the fourth. The shaft, known as No. 1, is down about half way and will be completed at the end of the present month. The shafts are connected by drifts on the first and third levels. A new shaft house is to be erected at shaft No. 2, west of No. 1, and will be 100 feet high; it will be a double cage shaft with separate apartment for ladder way. The two six-foot Lidgerwood hoisting drums received last week are in position and will be in operation next Monday. This machinery will hoist from shaft No. 1, and the old outfit will do a like service at No. 2 shaft. The engine and boiler house covering the new machinery is rapidly nearing completion. The buildings are each 26x42, set as an L. Beyond the opening of the lower level there is no dead work to be done, the ore on the third and fourth being nicely opened and ready to mine.—[Diamond Drill.

MARQUETTE RANGE.

The East New York has sold 20,000 tons of ore, and is negotiating for the sale of 20,000 tons more. The product of this mine is improved over that of any former year, and is popular with consumers. The property is said to be looking well. Should the additional 20,000 tons be disposed of it will represent the product of this season.—[Iron Ore, Ishpeming.

At a recent meeting of the directors of the Dexter, it was decided that prospecting work in the way of diamond drilling should be instituted at once. It is probable, also, that the shaft will be sunk 30 feet deeper than now. Should the drilling and sinking reveal nothing of importance, the abandonment of the mine will undoubtedly soon thereafter occur.—[Iron Ore, Ishpeming.

Messrs. Wills, Watters, Ely Ames and others, who are exploring for ore near the old Saginaw mine, in the hopes of finding a paying deposit on the continuation of the Winthrop mine run, have crossed 20 feet of ore formation to the north of their shaft, and about 16 feet of soaprock, being now in the latter. Indications are flattering for the discovery of something of importance.—[Iron Ore, Ishpeming.

George Gorton is exploring upon lands owned by the Pioneer-Arctic Co., located to the north of the Barassa and Negaunee properties about a mile. He has a shaft down about 35 feet, and lean ore has been found. It carries considerable quartz, but the prospector thinks this objectionable feature will disappear as greater depth is attained. Adjoining property is to be explored by citizens of Houghton.—[Iron Ore, Ishpeming.

Mining operations have been resumed by the Platt Iron Co., on its property adjoining the Wheat on the Cascade range. Mr. Charles L. Lawton, son of Commissioner C. D. Lawton, is in charge as local agent, and rather inclines to the belief that the Platt will ultimately have a place among the dividend paying mines of the county—[Negaunee Iron Herald.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1891, up to Wednesday, June 10, are as shown by the appended statement:

MARQUETTE RANGE.

Champion	2,062	Lake Superior	3,983
Total Marquette Range			6,045

MENOMINEE RANGE.

Ludington	22,149

GOGEBIC RANGE.

Ashland	1,853	Father Hennepin	4,521	Palms	2,120
Aurora	8,320	Germania	1,768	Pabst	25,465
Colby-Tilden	2,215	Montreal South	3,193	Sunday Lake	1,978
East Norrie	16,326	Mt. Hope	4,577	West Cary	10,632
Eureka	1,015	Norrie	32,360		
Total Gogebic Range					117,367

VERMILION RANGE.

Chandler	25,670	Minnesota	45,565
Total Vermilion Range			71,235
Grand totals			216,796

A Gigantic Machine.

The Union Iron Works, at San Francisco, recently completed a 100-stamp silver mill, which is one of the largest pieces of mining machinery ever built, and it is asserted by members of the company to be the finest stamp mill ever made anywhere. The mill was made for the Huanchaca de Bolivia Co., a corporation composed of Parisian and Bolivian capitalists. It is the largest silver-producing company in the world, and owns exceedingly rich and extensive mines in Bolivia, 14,000 feet above the sea. The company, whose engineering enterprises have been mentioned in *Machinery* on several occasions, has built a railroad 500 miles long from its mines to the sea coast at Antofogasta, Chili, where the mill will be erected. This mill weighs 2,000 tons in its entirety. Twelve hundred tons are being loaded on the barque S. C. Allen, and the rest will follow in another vessel in 30 days. The mill was begun in February shortly before the strike, and the first castings were made by union moulders. The strike delayed operations on it for a short time, but work was soon resumed by the men and it was speedily completed. It is the finest piece of modern mining machinery ever built. It is admirably finished, and it contains several improvements of a technical kind which will be interesting to mining engineers. The company sent two engineers from New York to inspect it after it was set up at the works, and they expressed themselves as delighted with it. There is not a very heavy demand for mining machinery at San Francisco at present. The whole Pacific Coast is supplied from that city, but owing to their ability to secure cheaper work, Chicago manufacturers are supplying most of the machinery made for export from that country.—[Machinery.

Scotch vs. American Pig.

Every now and then this question crops up, and at the present time the chances of competing with cheap American pig in the West are engaging consideration. Importers in Montreal claim the Scotch iron-masters are disposed to make a fight for some of this trade. It is quite natural that they should, but if the competition is to be keen, it would seem as though some change in present conditions were necessary. Briefly, if the bid is to be a strong one, concessions will have to be a consideration, for at present the planes of value vary sufficiently to be a consideration with the average buyer. It may go off sufficiently, but it has not yet done so, and indications are wanting. Of course, the usual quantity of Scotch pig will find its way Westward, a certain quantity of it always has to be bought for certain purposes; probably the quantity may increase this season, for stocks generally are very low, but when it is a question of competition in a regular way with cheap American pig, the subject has to be considered from a different standpoint—that is, what buyers are willing to pay. In fact, the matter is problematical, for although the American market is steady, it is not moving with sufficient freedom to warrant any material hardening in values, and if the present American plane is to be the criterion, it will mean something with cheap buyers. This rule, of course, only applies to the Western country, for the freight charges are too serious a consideration when it comes to placing American iron in the East. Briefly, the position is just as it always has been, and, as we have pointed out previously, the market for Scotch pig is steady enough when following the usual lines. A fair business is doing in the West, but the cost of production at home precludes the idea of much lower values, as they are in many cases below it now, according to some recent reports from Great Britain. Stocks in Montreal are very light, while the quantity afloat for Canada is exceptionally small for the present season of the year. This does not point to much alteration in values, at least in the immediate future.—[Hardware, Toronto.

Why Does Solid Iron Float on Molten Iron?

This question, which has puzzled a good many observers, was satisfactorily explained by Dr. Anderson, in a recent paper on steel, read before the Iron Institute, London. When a piece of solid iron is thrown into a pot of molten iron or steel the solid metal at first sinks, which shows that its volume is less than the melted metal. But soon the solid piece becomes heated, which causes it to expand, its volume is increased, and it rises and floats on the surface of the molten mass. The action is the same both with iron and steel. Mr. Wrightson said:

"The experiment was frequently made by throwing a piece of iron into melted steel. They could see it go down, and might think that it was on account of the impetus which the iron had attained in falling that height, but as a matter of fact if the iron were put upon a fork and lowered, it would go down; but in the course of a few seconds it came up again, and kept on expanding until the piece of iron was a considerable distance above the surface of the metal. Then it decreased in volume, and, of course, became of the same volume as the molten metal which it joined. Any one could see by the distance that the piece of iron went above the surface that it was of considerably less density than the molten metal."

THE first number of Volume II. of the *Outing Weekly Tennis Record* for the season of 1891, was published on June 13th, and it should be read by every devotee of the delightful game. It is the official organ and bulletin of the United States National Lawn Tennis Association, and bears the indorsement of Chas. E. Stickney, Secretary of that organization. The *Weekly Record* is tastefully gotten up, and, in addition to all official records up to date, contains portraits of noted players, a department of "Club Gossip," "Current Chat," "The Referee," and editorial paragraphs from the pens of prominent tennis players, while club matters, personals, etc., lend additional interest. The principal editorials refer to the new committee and amended rules of the U. S. N. L. T. A. The "English Letter," an article on "Mixed Doubles," and "Tennis in the South," are special features of a most attractive number.

THE iron deposits lately discovered in the vicinity of Canyon Diablo, 300 miles west of Albuquerque, N. M., and about eight miles from the line of the Atlantic & Pacific Railroad, are to be thoroughly examined and surveyed by Prof. A. E. Foote, a celebrated mineralogist of Philadelphia. The find is reported to be a large body of practically pure iron, 200 yards wide and of unknown depth and length.

Celebrate the Fourth

By going to some of the many delightful spots and shady nooks on the Nickel Plate, July 2d, 3d and 4th. One fare for the round trip.

THE NEW WESTINGHOUSE COMPOUND ENGINE GOVERNOR.

In the matter of regulation of speed, manufacturers become exacting with the introduction of improved and sensitive machinery. Most particular in this respect are the electric industries, which highly appreciate in a governor an ability to handle great and instantaneous changes of load. After two years of invention and experiment, the Westinghouse Machine Co., of Pittsburgh, Pa., have designed a governor for use with their high duty compound engine, whose efficiency they claim has never been equaled. With their accustomed

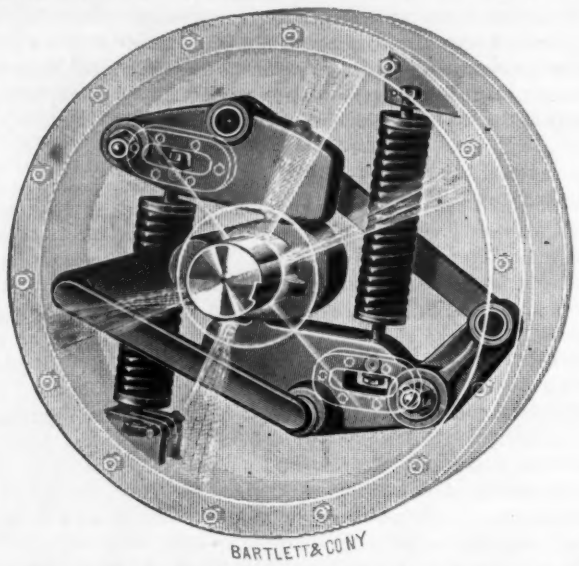


FIG. 1.—SHOWING ENCLOSED GOVERNOR CASE TO BE FILLED WITH OIL.

disregard of established practice, this company has had the same marked success with their governor as with their engine.

Sectional view of the governor (see Figs. 2 and 3) show at once its perfect simplicity, and an absence of all the usual attachments of dash-pot, balanced eccentric, interlocking devices, etc., whose only office is to interfere with the rapid adjustment of the governor. It will be interesting to note the details of its construction. A heavy unbalanced eccentric and strap places the center of gravity of the combination very near the center of the shaft without sacrificing its strength. Short, heavy springs with low initial tension are available in this form, and the governor is so compact, that it is placed in a heavy closed case which is completely filled with oil to insure the same certain and copious lubrication that obtains in all Westinghouse engines. While the governor, as a whole, is very heavy and perfectly free to move, even through its whole range if necessary, its strength is a variable quantity and its leverage increases so as to meet and resist the greater strains of longer cut-offs. The crowning excellence of the governor, however, is its ability to utilize its inertia for the necessarily rapid adjustment to meet instaneous changes of load. The mere

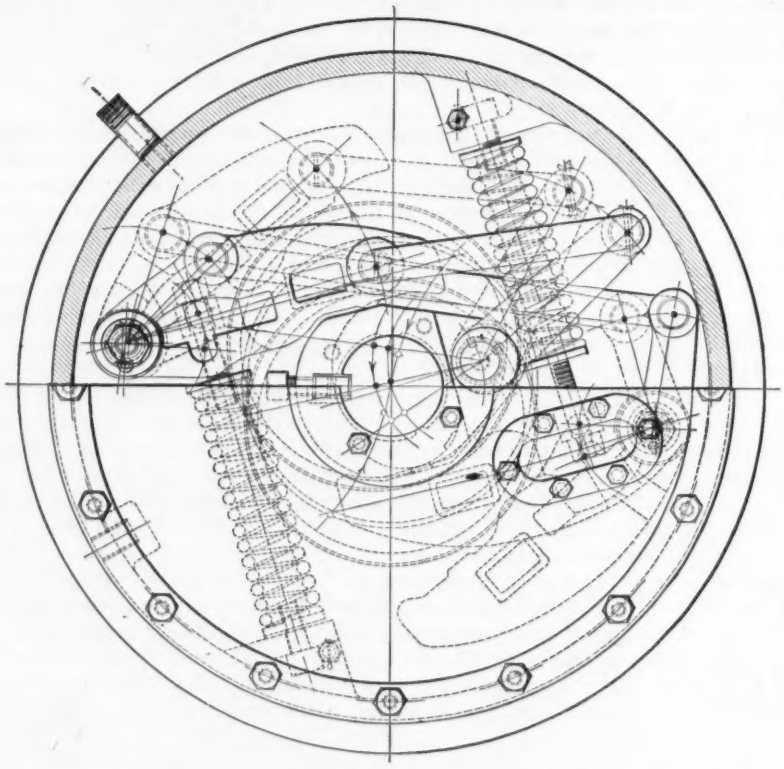


FIG. 2.—PART SECTIONAL VIEW, SHOWING DETAILS IN TWO POSITIONS.

tendency of the engine to change its speed to the degree demanded by the regulation on account of change of load, throws the governor to the new position to suit such new load, and the force that changes the adjustment of the governor is inertia. Other governors, as a rule, are actuated by changes of centrifugal force alone, and consequently require heavy fly-wheels, with sundry attached mechanisms to keep them from racing under violent or sudden changes of load. Without these attachments, the regulation is proportionately defective. In the new Westinghouse governor, centrifugal force is merely auxiliary. It has neither time to act, nor is it necessary for it to do so in order to accomplish the result desired. A test, so severe that it would be but seldom met with in practice, was made on an 18 inches and 30 inches by 16 inches Westinghouse engine with this form of governor at the station of the Federal Street & Pleasant Valley Electric Railway Co., in Allegheny City,

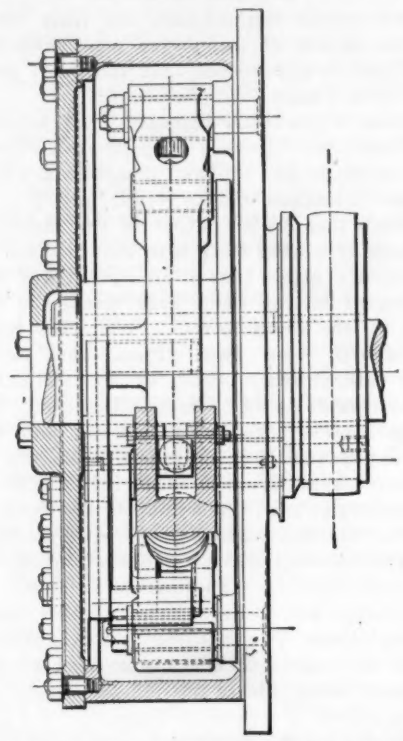


FIG. 3.—SECTIONAL VIEW, SHOWING POSITION OF ECCENTRIC.

Pa., and fac-similes of the indicator cards are submitted as evidence of the rapidity of the governor's action.

Card No. 4, taken under constant load and for one revolution, is given for comparison only.

Four circuits are driven by this engine, and in card No. 5 one of these was

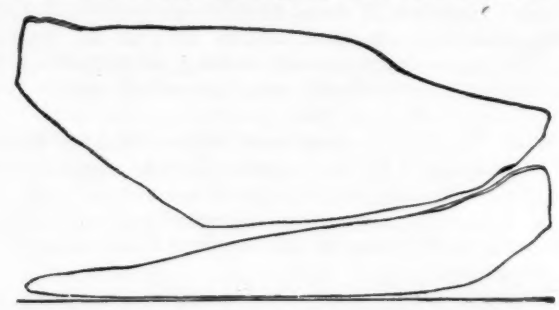


FIG. 4.—A SPECIMEN INDICATOR CARD FOR ONE REVOLUTION, SHOWN FOR COMPARISON.

broken while a continuous card was taken from the high-pressure cylinder. The card for one revolution from the low-pressure cylinder was taken after the change in load, and has no connection with the test.

Card No. 6, was similarly taken while three of the four circuits were bro-

FIG. 5.—SPECIMEN INDICATOR CARD, CONTINUOUS THROUGHOUT A PARTIAL CHANGE OF LOAD.

ken at the same time, and shows an average change of 87 horse-power per second. It also shows that the governor was perfectly stable in its position

FIG. 6.—SPECIMEN INDICATOR CARD, CONTINUOUS THROUGHOUT AN EXTREME CHANGD OF LOAD.

At this rate, the governor would travel over its entire range corre-

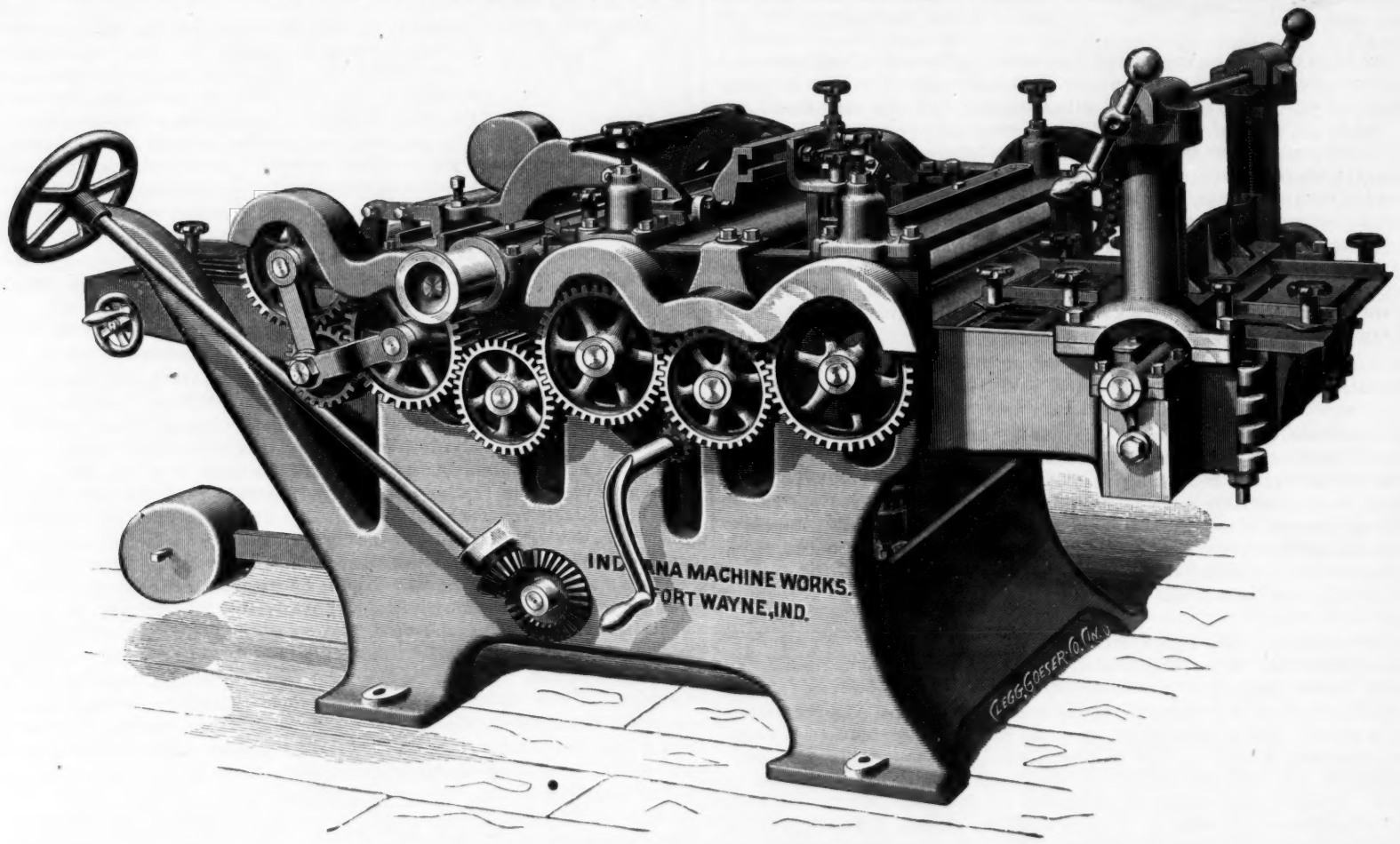
sponding to a change of its listed capacity of 250 horse-power in less than three seconds, which is about the time necessary to increase the speed of the engine the amount demanded by the regulation, and with a lighter fly-wheel this change would be made in proportionately less time.

It is evident, therefore, that with this governor, the fly-wheel becomes simply a balance wheel. It is no longer required in storing energy to delay the change of speed and thus give centrifugal force time to act on the governor.

DOUBLE CLIPPER PLANER, MATCHER AND MOULDER.

The accompanying engraving is a true illustration of a new double surfacer, matcher and moulder. It has two cylinders, planing both sides and matching all at one operation. It was designed to meet the requirements of all interested in the wood-working industry, demanding a machine capable of performing many duties, and with such adjustments that would permit of a speedy manipulation. The frame is cast in one heavy and massive piece, securing for the machine that rigidity unattainable where it is sectional. The table is cast in a similar manner, is very long, and provided with a heavy platen placed immediately under the top cyclinder, being removable will admit of dressing (in the event of uneven wear resulting from years of service) without having to disturb the table proper; the latter is adjustable with matcher heads in bearings 12 inches long by 26 apart, by two heavy screws centrally located, and controlled by a large hand-wheel, placed in convenient reach of operator, and all so arranged as to make the duty of elevating the table to the desired position a comparatively light duty.

The top cylinder is made of a crucible steel forging, has large journals, is driven by two belts, is slotted on two sides, tapped on the other sides, and as



DOUBLE CLIPPER PLANER, MATCHER AND MOULDER.

the machine is provided with adjustable pressure bars, cutters of almost any description may be used at any desired point, projecting any distance beyond lip of cutter-head not exceeding 1⅛ inches, without removing any of the fixtures just mentioned. The lower head is made of same material and same manner as the upper, except that it is driven by one belt. Its bearings are large and fitted into planed surfaces, thus admitting of a vertical adjustment; the pressure shoe is very stiff, and may be quickly adjusted from either side of machine. The end of table is very substantial and swings on a heavy hinge, furnishing free access to the head.

The six feed rolls are very large, have substantial bearings, are all powerfully geared, the gears being cut from the solid, and controllable instantly by a belt tightener. There are two speeds of feed namely, 35 and 65 lineal feet per minute. The front feed roll is weighted, keeping a uniform presure on roll, no matter how great the cut to be taken.

The matcher spindles are of large diameter, made of refined steel, and revolve in long self-oiling bearings, with provisions to compensate for wear. Three winged gun-metal heads with bits are furnished, and if desired will substitute them with shimer heads. These heads are adjustable separately, or together, from either front end of table or side of machine, the guide fence moving with the head on the same side of machine. The spring holding lumber to guide is also controlled by hand-wheel, and may be placed in any desired position almost as quick as it takes to tell it. When matcher heads and other fixtures are removed, planing to the full width of machine may be done. These changes are quickly and conveniently made. Manufactured by the Indiana Machine Works, Fort Wayne, Ind.

SIGNIFICANT OF ACTIVITY.

The iron ore business of the season has opened up briskly—a long time coming, but it has got here at last. *The Iron Trade Review*, current number, is our authority for stating that Mr. Carnegie has "loaded up" to the extent of about twelve hundred thousand tons, about a million of which is of Bessemer grade. It is currently reported that of this million tons of Bessemer ore the list includes 300,000 tons of Minnesota, of a dozen kinds and as many prices, 250,000 tons of Norrie, which for this occasion is said to have been considerably shaded under the opening price, which was $4.50; 200,000 tons of Chandler at $4 25; 75,000 tons of Champion at $5.50; 50,000 tons of Cliffs' Shaft at $4.25, and 50,000 tons of Salisbury at $4 15, along with some other ores not definitely stated. The non-Bessemer sales for the same consumer are said to include 100,000 tons of Lake Superior No. 1 at $4 50. Among other sales reported for the Pittsburgh market are some Lake Angeline ores, of all the grades, and some Pewabic ore. Says the *Review*: "The producers, it seems, were fairly stumbling over each other in attempts to dispose of their output and at any price they could get for it."

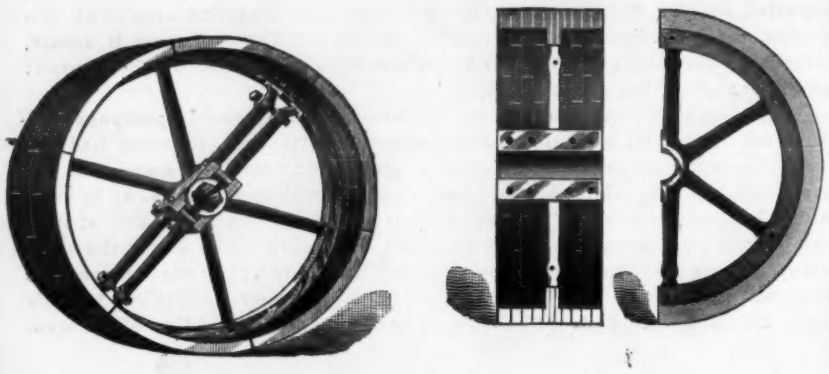
This was slow coming about, the conditions of trade having postponed all all movements and shut down the furnaces. Pittsburgh furnaces had not bought over 500,000 tons up to March, as against ten times that amount at the same date last year. Ores that are now being placed are at from $1 25 to $1 75 under last year's rates. For instance, No. 1 hard Angeline, which sold at $7.25 last year, is now being contracted for at $6; Section 16 holds about the same value. These ores are very fine, containing from 60 to 65 per cent. of metallic iron, and remarkably little phosphorus, hence are very desirable. All this does not look like high prices, but it seems to be the opinion of the most learned heads in the trade that Bessemer pig will get up to $18 this season, an advance of $2 on the present figure. However this may be, the opening of the ore market indicates the beginning of trade this year, and that it will be an active trade there is every good reason to expect. The two important features, the money market and the crop condition, were fair last week, in fact, considerably better than fair. This week an improvement in both is reported. In addition the Pennsylvania Railroad Co. has placed its order for rails, and usually this company starts the railroad purchases each year. This year these purchases will be large, for the big traffic of an excellent harvest and the preparations for handling the passenger travel of the World's Fair, and the fact that railroads have been permitted to run down more or less for eight months past, must have the effect to make brisk demand.—[National Labor Tribune.

The First 12-inch Steel Gun Cast in the United States.

The first 12-inch steel gun made in the United States has been completed at the Watervliet Arsenal, Troy, N. Y., and shipped to the Sandy Hook proving ground for trying. The gun weighs 52 tons. It is 36.66 feet long, and the length of its bore is 34 feet. Its charge is 440 pounds of powder, and its projectile weighs 1,000 pounds. The powder pressure that will be exerted on its interior when the gun is fired is 16.5 tons to the square inch. The initial velocity of the projectile will be 1,940 feet per second, the muzzle energy 26,000 foot tons. The tube and jacket forgings for this gun were purchased at Le Creusot, France, and the remaining forgings were obtained from the Midvale (Pa.) Steel Works. This is the largest steel gun built in this country.

A NEW SPLIT PULLEY.

Users of machine pulleys will be interested in examining the accompanying cuts and in studying the following description of same. The pulleys have a wood split rim with iron arms and hub. The arms are made of iron, light and strong, yet do not fan the air and stir up dust and dirt at the expense of a vast amount of power as the wide wooden arm pulleys do. The rim is made of the best Southern poplar, seasoned and kiln-dried, cut into cants which are formed into rings and these rings glued and nailed or doweled together. The arms are fastened into the rim by setting in the large iron rings on the ends of the arm and pouring melted brimstone around the same forming a perfectly solid joint, equal to bedding in stone. A bolt is afterwards put through for an additional fastening. The pulley is then turned and finished with the best of shellac. A set screw is put in the hub which can be used or not as desired.



The iron hubs can also be key seated if necessary. There is a handsome and mechanical appearance about the pulley, nothing awkward or clumsy. Segments glued with the grain crossed will not warp and lose their shape like bent rims or pulleys made of solid pieces of wood; the best recommendation for iron arms and hub, is the fact that all manufacturers of wooden hub pulleys, always use some form of iron hub for large pulleys or heavy work. It is impossible to throw the pulley out of balance with the set screw as the hub is tightly clamped to shaft so that the set screw cannot lift it, but on the other hand prevents slipping as in the wood hub which may cause fire and always is a loss of time in any factory. These pulleys are being made by the Ohio Pulley & Machine Co., of Warren, O., to whom all inquiries should be sent. They are making a specialty of very large pulleys, 6 ft. and up, where the wide wood arms are not desirable or satisfactory.

SPECULATION IN IRON WARRANTS VS. LEGITIMATE TRADE.

The promoters of the Pig Iron Warrants Bill could not have or desire more conclusive testimony to the value of and necessity for their measure than the state of the warrant market during the last two months. It has been made the sport incontrovertibly of gamblers, pure and simple, who have not a fraction of real interest in the trade itself, and legitimate business has practically been suspended, for it could not be expected that regular buyers would operate when such a wild, uncertain condition of affairs prevailed. In the face of this it is difficult to believe that there should be any opposition to a genuine attempt to restrict or regulate what, it must be conceded, is an unmitigated evil, and has worked incalculable injury to the industry at large. The true interests of the trade would be infinitely better promoted if, by legislation or any other means, such organizations as the London and Glasgow iron "rings" were abolished, for it is nothing short of a grave scandal that the regulation of prices should be taken altogether out of the hands of the producer and consumer, who have a vital interest in them, and given to people who have nothing at all to do with the production, distribution, or the consumption of the iron. The ordinary supply of and demand for iron have little to do with the determination of the value of pig iron when the gambling fraternity step in. The speculation has undoubtedly intensified the depression which was in progress when it set in so fiercely, and the legitimate traders who have reaped any good out of the business of the last two months have been few indeed. The paralysis of legitimate trade has told very keenly upon many branches of the iron and steel industries besides the pig iron department, and we hear of works being closed in many parts of the country through lack of orders.

Any improvement in the iron trade must naturally begin with the finished departments, and extend to the pig iron branch; it is out of the question that it should commence with the raw material. But the artificiality of the course of the market during the last two months will be recognized when we state that pig iron warrant prices have gone up 20 per cent. or more, when the legitimate demand for and consumption of pig iron were actually declining, and when business in the finished iron and steel trades was falling off. The present situation has been brought about in this wise. When the Scotch blast furnacemen's strike, which lasted from October to March, was ended by the men abandoning their claim for extra pay for Sunday work and accepting 20 per cent. reduction of wages, the Scotch pig iron makers began to blow in their furnaces. Naturally the Glasgow "bears" inferred that an increased production of pig iron coming with a decreased consumption of it would lead to lower prices, and they commenced to sell very heavily, at the current rates, warrants which they had not got, and which they put off buying while they forced prices down. They made a determined onslaught upon these, and without doubt depressed the quotations for warrants much more than the actual state of the trade really justified. They neglected buying to cover their sales until there appeared no chance of running down the value of warrants any further. But here they were finely caught, for when the time came for them to deliver the iron they had sold, and when it was absolutely necessary that they should buy without more delay, they found they could not get the iron they needed.

When they were recklessly selling, the London "bulls," who are reputed to be very wealthy individuals, bought up large quantiites of Scotch warrants, and when the Scotch "bears" were compelled to buy they had to pay pretty nearly whatever price the London operators chose to ask, for these later were undoubtedly the masters of the situation. They have made the "bears" smart more severely than they have for years past. Very heavy losses among them have been the consequence; in fact, it is contended that by the late deals the Glasgow people have dropped over a quarter of a million sterling, and some failures among the speculators have followed, with others in prospect. The establishment of the London iron market has thus proved even more detrimental to the operations of the Glasgow "bears" than the latter ever expected it would; it has prevented them having it all their own way in the matter of regulating prices, as they had been accustomed to have. These London operators appear to have got the measures of the Scotch "bears," and know just how much they can be "squeezed;" they therefore do not force up prices as high as they might, because if they did, the "bulls" might themselves be losers, for while they might get the heavy differences out of a few of the sounder "bears," they would drive the weaker fraternity into the bankruptcy courts, and secure nothing from them, for debts of this kind are not recoverable at law. The "bears" had their innings till the first week in April, the 6th being the day of the minimum prices, when Scotch pig iron warrants werewn do at 42s. 2½d., hematite at 46s. 7d., and Middlesbrough at 37s. 7½d. Then it was that the "bulls" found that their opportunity had come, and since that day they have sold Scotch warrants at 54s. 3d. cash, hematite at 53s. 9d. and Middlesbrough at 42s. 9d.—advances of 12s. 0½d., 7s. 2d. and 5s. 1½d. respectively.

Meanwhile, what influence is all this gambling having upon legitimate trade? That it is the reverse of beneficial, except to a few, there is not the least reason to doubt. It has raised the price of pig iron to consumers, who have not been able to get any more for their finished goods, and the increasing unprofitableness of the trade has led to the stoppage of several important works. This gambling in warrants has so disorganized business in other departments than that of pig iron that consumers have been afraid to operate, even when low and what should be tempting prices were quoted. If it were in the pig iron trade alone that the business was disorganized there would not be so much to condemn; but when all other departments of the iron and steel industries feel the evil effects, it is time that some steps should be taken to put a check upon such illegitimate transactions as are common upon the warrant market.—[Colliery Guardian (London).

Foreign Nations at the Columbian Exposition.

Official acceptance of the President's invitation to participate in the World's Columbian Exposition, at Chicago, has been received from the following foreign governments: France, Great Britain, Germany, Spain, Japan, China, Mexico, Peru, Honduras, Salvador, Costa Rica, Colombia, Cuba, Guatemala and Jamaica. Unofficial assurance of acceptance has come from Egypt, Morocco Nicaragua, Venezuela, Ecuador, Brazil, San Domingo, Hayti and British Columbia. It is reliably reported that the British colonies in the West Indies and South and Central America, including British Honduras, British Guiana, Jamaica, Trinidad, Barbadoes and other islands, will unite in the erection of a "West Indian Court"—a building typical of tropical architecture, and filled with tropical exhibits of most varied and interesting description. In addition to the information given above, reports have been received at Exposition headquarters that great interest concerning the Exposition is felt at Austria-Hungary, Belgium, Holland, Norway and Sweden, Russia, India and other countries, and that their participation is almost a certainty. Many of the foreign nations will erect buildings of their own. But few particulars have yet been received concerning the amounts which foreign nations will expend on their exhibits, but the probability is that they will be larger than for any previous world's fair.

A Big Deal in Steel.

A special to the Pittsburgh *Dispatch* from Boston, June 10th, says: The Boston representatives of big iron and steel houses are much interested in a rumor current to the effect that a consolidation of two of the largest firms had been effected. If such is the fact it is not yet known to the trade. Charles C. Lounge said that the iron trade had been prostrated for the past six months by a constant and gradual declining of prices, and that its present stagnation is due to a lack of stability in prices and a want of confidence among buyers as to whether the schedule had reached bottom. The two concerns in New England which would be the parties to such a combination, if one were formed, he said, would be the Tremont Nail Co., of West Wareham, Mass., and the Nashua Iron & Steel Co., Nashua, N. H.

There may be some sort of a combination similar to the Atlas Lock Corporation which has now been in successful operation for four weeks, or there may be a joining of interests of the tack plate makers. In this industry New England leads the country, and the movement of the five large houses in this line is regarded in the trade as a wise measure, serving to check an unhealthy competition. In a period of less than eight years there have been forced out of business upward of ten extensive rolling mills in New England.

THE construction department of the Exposition is authority for the statement that by the Fourth of July 15,000 men will be at work on the World's Fair buildings in Jackson Park, and that a month later the number will be not less than 30,000.

Either Direction and Any Place.

One fare for the round trip on the Nickel Plate July 2d, 3d and 4th. Fourth of July excursions.

A NEW CINCINNATI INDUSTRY.

The Boughen Engineering Co., office 179 Race street, Cincinnati, O., was organized about a year ago with T. W. Boughen, President; W. C. Murray, Vice-President; I. M. McCabe, Treasurer; F. B. Leopold, Secretary; R. B. Cullen, Engineer; to carry on a general contracting and construction business, to furnish estimates and make contracts for complete outfits, or furnish and put up any kind of steam engines or other machinery. The company is prepared to make contracts for the erection of factories, flouring mills, water works, electric light, all kinds of brick and stone work for foundations of machinery, dams and hydraulic work, and to do sewer building and pipe-laying.

The members of this company, with an experience of 20 years in all the kinds of work they undertake, and being thoroughly familiar in all of its details with the best kinds of machinery suited for the purposes needed, feel this should be of some benefit to any of less or imperfect experience in all such matters.

With this experience this company feel that such a firm as theirs handling various kinds of machinery, and having the influence and support of some of the most reliable makers of said kinds of machinery, and who stand in the front rank in their respective lines as such, that they can supply all needs, and give that care and attention which makers of single articles of machinery may not always do. With this fact in view an individual firm or corporation, having everything supplied by and all their work done by a construction company, have only to look to one party for everything. In this way they are saved much time and care and expense in the contracts, in what is being done, than would be the case in machinery with its needed connections with several parties.

It is not difficult to see that any article of machinery will work very poorly, if not almost useless, if not properly put up in every particular. A faulty engine or poorly constructed furnace, expensive in fuel, and alike poorly constructed boiler, not furnishing the needed quantity of steam, though claimed it will do so, are all a source of annoyance to anyone, and sometimes take much time and make expense in making needed changes, to have all in shape to do good work at all times.

The following are among the lines of machinery, boilers and furnaces and many other articles handled by this company, and they are prepared at all times to fill orders in any quantity wanted, feeling that every article will give complete satisfaction.

First, the Beck automatic engine, is well made of the best material of all kinds. The automatic cut-off is a new feature in this engine, its use has shown it to be perfect in every particular. While this engine is high speed and the result of great care and study, and well adapted to meet all the needs in the perfection of electric lighting, it can be used with success at medium speed for all kinds of mill and factory work.

Next is the Hamilton Corliss engine, and as one among the several makes of the Corliss engine, has a very high reputation where known and used. While in their make-up they may vary from some of the same class of engines, they are simple in their construction and at the same time strong and well made. All the material used in building same is of the very best which can be obtained in the market, and they are finished up in good style, and well calculated to meet the needs in all kinds of business for which wanted.

The Tiger stationary engines are from two to 40 horse-power. These engines, while different from the two other kinds noted, are strong and well made, of a fine quality of material, and put together in good shape to render good service for all kinds of work where such kinds of engines are used or needed.

The Clipper vertical engine, is an engine and boiler compactly put together, strong and well made, and takes up a small space and is well arranged to do all kinds of work where such an engine is used, with small expense of fuel for size and power of the engine. Their vertical engine is a superior one and has all the good features of engines of same class, and is well made of the best material and of more relative strength than other engines of its kind in the market. It is suited for small space and fitted with link motion if desired, and when so desired can be mounted on same base with vertical boiler. This engine is very suitable for tug boats, yachts, etc.

The Beck twin compound engine is a new departure in steam engines, and has new features of much merit not in the make-up of the engines in its class. One new feature is that the cylinders are side by side instead of in front of each other, as is the case in what are known as the tandem engines, and have one wall between and thus are called the twin engine. These engines are strong and well made, of the finest quality of material, and arranged so that every cylinder and valve chamber can easily be reached by the engineers.

This engine is so arranged in the use of steam as to be economical in running, and has important features as to loss of time in making repairs in case any accidents should occur, and small expense in making repairs on account of their simple construction, which is an important item not to be found in the tandem engines, where the whole engine has to be torn down in making repairs. This would be very much the case where used for electric light or street railway purposes, and for these two purposes named, it will take the front rank in all kinds of any like class of first-class engines.

Of their return tubular boilers, great care is taken in making of same. They are made with the best 60,000 lbs. tensile strain flange steel, and are made with drums. The Root safety boilers are among the best if not the best now made and used, and consists of a nest of inclined water tubes, their front and back ends connected with horizontal overhead drums. The water forced from tubes in front end of the drum is replaced by a downward flow from rear end of the drum to the rear end of the tubes, making a continuous circulation of all the water in the boiler, the steam being set free into the upper portion of the drums. Boilers of this arrangement are considered better and more economical for generating steam than any others, on the ground of economy in the use of water. The station of the Edison Electric Light Co., in Philadelphia, has a battery of the Root boilers in use.

The Murphy smokeless furnace is claimed to be one of the best now in use or being made. More than ten years ago Mr. Murphy went to work to get up a furnace which should be smokeless and economical, and automatic in being self-feeding and self-cleaning. In doing this he worked on original ideas and plans in the design, and did not make use of any of the styles of furnaces then in use, and in time brought out the furnace here noted. The Murphy furnace is in particular well fitted to use slack and small size coal, which, placed into large magazines, is fed automatically into the furnace, and while working the boiler above, its rating is economical and smokeless.

In a comparative smoke test made by John W. Hill, M. E., at the Cincinnati Exposition, in 1879, with several other well-known furnaces, this showing was made:

Murphy.	Walker.	Eureka.	Price.	Fisher.	Common.
100	88	87	82	81	50

And in economy of water per pound of coal:

Murphy.	Walker.	Eureka.	Price.	Fisher.	Common.
1,245	7	8.4	1,180	482	7

In these tests the Murphy was shown to be perfectly smokeless and making a saving in fuel of 77½ per cent. over the common furnace.

Among other articles the Boughen Engineering Co. handle the Goubert vertical heater, horizontal heaters, Webster's vacuum exhaust steam economizer, Hoppes' feed-water purifier, the Hyatt pure water system of filters, Root's patent spiral seam riveted pipe, Isaac Potts' patent pipe connections, the elastic metallic packing, improved horizontal pumps and horizontal section pumps, twin pattern duplex piston pump for general pumping purposes, and same of high pressures fitted for small water works. This latter pump has the Fisher governor, which is used in the direct pressure system, and by which the water is kept under perfect control, regulating same as the steam valves are opened or closed, as the varying quantity of water comes from the mains, a very desirable feature in this class of pumps. Outside packed plunger duplex pump (twin pattern), outside packed plunger pump (single pattern), duplex heavy pressure pump, duplex tank or low service pump, compound duplex piston pumping engine, compound outside packed plunger water works pumping engine, of this engine this company have put up many in cities, taking the water from the Mississippi, Ohio, Alleghany, Rio Grande and other rivers, where the water has gritty substances. Combined pump and boiler, a very convenient management where economy and space are to be considered, vertical sinking and deep well pumps and duplex piston power pump. In another line of machinery handled by this company, are the well-known Hill clutch couplings and pulleys.

The Boughen Engineering Co. are prepared to furnish, in large or small quantities, many other lines of goods not mentioned in this article, and all of well-known makes and reputation. The following are among the many contracts made by them, in the year they have been carrying on business:

Two million-gallon water works, London, O.; 3,000,000-gallon water works, Huntington, Ind.; 1,000,000-gallon water works, Harrison, O.; water works plant, Iron Mountain, Mich; one boiler plant Murphy furnace, the Colorado Storage Co., Denver, Col.; one boiler plant and boiler house and brick stack, the Blymeyer Ice Manufacturing Co., Cincinnati, O.; two three and a half million-gallon pumps for water works, Cincinnati, O.; one boiler plant, Cincinnati St. R. R. Co.; one electric light plant, St. Nicholas Hotel, Cincinnati, O.; one electric light plant, Hotel Mitchell, Cincinnati, O.; one electric light plant, H. S. Pogue Co., Cincinnati, O; one brick stone pumping station stack for the water works, Van Wert, O, and many others. From this it will be seen that this company have thus far made good headway in their business, and a good prospect for them of increasing same very much ere this year ends.

The Krupps to erect a Gun Foundry in China.

It is reported that Messrs. Krupp are negotiating an important contract with the Chinese Viceroy, Li Hung Chang, for the construction and fitting of a factory for cannon and small arms at Tientsin. The *locus* of the factory is to be near the Kaiping coal fields, and Krupps are to undertake the establishment of the factory and the working of it for a certain number of years, after which it will become the property of the Chinese Government, Krupps meantime to have a monopoly of the manufacture of the articles produced by the factory. It is further stated that the negotiations are being carried on by the German Minister in China, and that he has paid for the concession in the shape of diplomatic complaisance, the precise nature of which may appear later on. At present it is said not to be unconnected with certain advantages obtained by the Chinese in the discussions preceding the recent Imperial audience to the foreign representatives in Pekin.—[Iron & Steel Trades Journal, London.

OHIO, which has an appropriation of $100,000 to spend on its World's Fair exhibit, intends to put about a quarter of it into a building, which will be made the State headquarters on the grounds. The Ohio Archæological and Historical Society wishes to make a separate display.

FRED J. SKIFF, formerly editor of the Denver *Tribune*, and recently engaged in mining enterprises, has been appointed chief of the department of mines and mining of the Columbian Exposition. He is one of the Colorado commissioners.

Travel and Fireworks

Are necessary on July 4th. Take the Nickel Pate cheap rate excursions, going July 2d, 3d and 4th, returning until July 7th, 1891.

THOUSANDS of Knights in one day will congregate at Ft. Wayne, Ind., at Knights of St. John Convention. Go via Nickel Plate. Special cheap rates.

PROTECTING YOUR BUILDING With an automatic fire sprinkler system makes it absolutely fire proof. All Insurance Companies recognize the "Neracher" as the best made and will make liberal reductions on your present rates if you equip. In this way the system pays for itself inside of two years' time.

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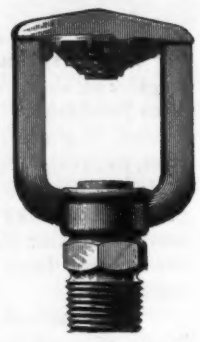


THE NERACHER SPRINKLER CO., - WARREN, O.

BRANCH OFFICES:

Boston, Chicago, St. Louis, Cleveland, Cincinnati, Minneapolis, Pittsburgh, New York, Philadelphia, Baltimore, San Francisco.

INDUSTRIAL SUMMARY.

New Enterprises:—

The Drummond McCaull Pipe Foundry Co., Montreal, has been incorporated, with a capital stock of $50,000, for the manufacture of water and gas pipes, etc.

The Thornburg & Schroeder Mill Supply Co., Moundsville, W. Va., will erect a plant for the manufacture of roller process flour-mill machinery, supplies, split pulleys, etc.

The Automatic Knife Co. has been incorporated, with a capital stock of $25,000, and will erect a factory at Gananoque, Ont., for the manufacture of a patent automatic pocket-knife.

The Wallace & Graves Machine & Foundry Co. has filed articles of incorporation, at Lafayette, Ind. The capital stock of the company is $20,000, and it will manufacture steam boilers and castings.

Charles H. Spang, Jno. W. Chalfant, Campbell B. Herron, Geo. H. Chalfant, M. A. McNeil, Jno. C. Porter, Walter C. Steels and James B. Herron will make application for a charter for the Spang Steel & Iron Co., of Pittsburgh, Pa.

The Bailey-Farrell Manufacturing Co., of Pittsburgh, Pa., have been granted a charter of incorporation, with a capital stock of $300,000. The new concern succeeds the old firm of Bailey, Farrell & Co., manufacturers of and dealers in plumbers' supplies, who have done business in Pittsburgh for many years.

The new safe and lock works which are to be erected at Elizabeth, N. Y., has been duly organized with a capital stock of $200,000. They elected J. R. Wylie, as Treasurer, and C. H. Underwood, E. W. Neff, J. T. Hough, J. B. Sheriff, Jas. H. Graham, W. C. Voigt and John Collier as Directors. The company will be known as the American Vault, Safe & Lock Co.

At the Newport session of the Rhode Island State Legislature, held recently, the following were incorporated: Rhode Island Steel Casting Co., Corliss Safe Door Co., Rhode Island Horseshoe Co., Tockwotten Machine Co., Hathaway Steam Trap Co., Safety Nut & Bolt Co., Easton & Vernon Machine Co., American Electrical Works, and Benham Steam Engine Co.

The Atlanta Iron & Steel Casting Co. has been organized at Atlanta, Ga., with a capital stock of $150,000, for the purpose of making malleable steel castings by the Bates' process. The following officers were elected: Edward Van Winkle, President; W. L. Atwater, Vice-president; A. R. Ryan, Secretary, and W. H. Trezevant, Treasurer. Work will be commenced at once.

Among recently organized corporations in Illinois are the Chicago Down Draft Boiler Co., at Chicago; capital stock, $50,000; for the manufacture of steam boilers and furnaces; incorporators, S. Moody, W. L. Grey and E. S. Griffing—The J. L. Perry Machine Co., of Chicago; capital stock, $100,000; for the manufacture of wood-working machinery; incorporators, W. S. Hefferan, J. P. McGoorty and G. W. Kolb.—N. B. Pullman Co., Chicago; capital stock, $200,000; to manufacture railway appliances; incorporators, E. Gaylord, C. N. White and M. J. Frost.—Schneider Combination Car Co., Chicago; capital stock, $200,000; to manufacture railroad and street cars; incorporators, John G. Schneider, Frank Riedel and Bernard McDevitt.

Additions, Enlargements, Removals, etc.:—

The plant of the Donaldson Iron Co., Emaus, Pa., is to be increased.

M. Osborn is to add new machinery to his mill at Bloomingdale, Wis.

The Muskegon (Mich.) Iron Works are building a structure 220x90 feet in size.

Wallace, Banfield & Co., are to add a new cold rolling mill to their plant at Irondale, Pa.

The Davis & Furber Machine Co.'s foundry at North Andover, Mass., is being enlarged.

Lucadoe & Hager will, it is reported, put new machinery in their iron foundry, at Glen Elk, W. Va.

The Hendrick Manufacturing Co., of Carbondale, Pa., have broken ground for a new machine shop, 140x40 feet.

The Industrial Iron Works, at Bay City, Mich., are preparing to build an addition, 255x90 feet, to their works.

The Sioux City (Ia.) Engine Works are adding new special machinery, which will greatly increase their facilities.

Barbour, Stockwell & Co., Cambridgeport, Mass., iron founders and machinists, have recently erected new buildings. The new plant consists of a foundry 175x75, machine shop 100x50, three stories, and pattern-storage building 100x60, three stories. The specialties of this concern are railroad castings and machinery for bread and cracker baking.

The Noyes & Nutter Manufacturing Co., of Bangor, Me., are erecting a new foundry building at that place at a cost of $6,000.

The Farrell Foundry & Machine Co., Waterbury, Conn., will begin work soon on a new machine shop 100x100 feet, one and two stories in height.

The Cincinnati Screw & Tap Co., of Cincinnati, are building a new shop in the northern part of the city, which will be arranged with special reference to their business.

A new building, to be equipped with machinery, is to be added to the plant of J. M. Robins & Co., manufacturers of special metal-working machinery at Cincinnati, O.

The Russell Wheel & Foundry Co., of Detroit, Mich., will build an entirely new plant, with increased capacity and better shipping facilities than offered by the present works.

The Beecher Manufacturing Co.'s plant, at Meriden, Conn., has been purchased by the Peerless Buttonhole Attachment Co., who will begin the manufacture of a patent wrench.

The Mason-Perkins Manufacturing Co., Bristol, N. H., has begun work on the foundation for an extension to its machine room, and will shut down about July 1 to complete the work.

The Royal Bridge & Iron Co. (Limited), Montreal, Canada, has been incorporated, with a capital stock of $20,000, to manufacture steel, iron and other bridges, and all structures of iron and steel.

The J. Morton Poole Co., of Wilmington, Del., are erecting a large addition to their machine shops. The addition is 150x80 feet, built of iron and brick, with a slate roof, and will be practically fire-proof.

Messrs. I. Matheson & Co., New Glasgow, N. S., are building a 150x75 feet addition to their works, to be used in the construction of steam boilers. This concern is a large manufacturer of mining machinery.

The Canton Foundry Co., of Canton, O., have purchased a site at Hammond, Ind., to which they propose to transfer their works. The land lies north of the Grand Calumet river, within 20 miles of the center of Chicago.

The Etna Iron Co., of Bridgeport, O., intends to enlarge its mill, and put in a new battery of boilers. It is also understood that the company intends putting in new pumping machinery, having a capacity of 500,000 gallons daily.

The F. T. Aschman Steel Casting Co., of Sharon, Pa., have applied for a charter of incorporation under the name of the Aschman Steel Casting Co. The incorporators are J. J. Spearman, E. A. Wheeler, F. T. Aschman, Edward Roberts, W. S. Roberts, Geo. A. Baird and Fay Alderman. Larger capital will be employed, and the plant of the firm will be considerably enlarged. Although this concern have been in existence for only a short time, they have done an excellent business, and report plenty of orders on hand.

A new industry at Canton, O., says the *Repository*, is the Barnett Brass Works, now of Mansfield, O. It will employ not less than 50 skilled workmen to start with. Mansfield made liberal advances to retain the industry and Massillon was in the field against Canton, but the choice fell to the latter place. This was largely owing to the fact that the J. H. McLain Machine Co., of this city, have very heavy interests in the brass works, and used its influence in behalf of this city. The shops of the new company will be located at the corner of South Cleveland avenue and the Fort Wayne railroad. It is hoped to have the plant established within the next 60 days.

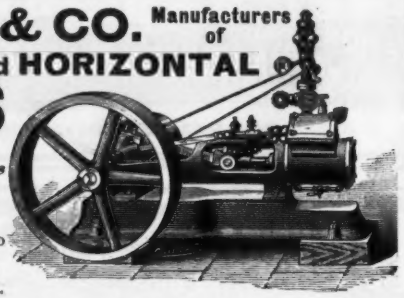
The Seneca Falls Manufacturing Co., Seneca Falls, N. Y., have recently been reorganized as an incorporated company, with a paid-up capital of $60,000, for the manufacture of foot and hand power machinery, tools and hardware specialties. The directors of the company are: Adelbert S. Davis, Paul B. Kendig, John Cuddeback, Henry M. Darling and Eugenia Davis. The officers of the company are as follows: President, Adelbert S. Davis; Secretary and Treasurer, Paul B. Kendig; and Superintendent, Henry M. Darling. The company anticipate making some extensions in the business, and will commence at once the erection of a large four-story brick building adjoining their present works.

Fires and Accidents:—

The Anstead & Higgins Spring Works, at Racine, Wis., have been destroyed by fire, at a loss of $17,000.

The plant of the American Screen Co., Detroit, Mich., was destroyed by

THE JAMES LEFFEL & CO. Manufacturers of
IMPROVED UPRIGHT and HORIZONTAL
ENGINES & BOILERS
3 TO 26 HORSE POWER.
STRONGLY BUILT on BEST Principles for SMOOTH and ECONOMICAL WORK.
Over 4000 in Use.
Write for free PAMPHLET and state your wants to
THE JAMES LEFFEL & CO.
SPRINGFIELD, OHIO or NEW YORK CITY.



fire on the 23d ult. About 100 dozen window screens and considerable wire netting were, however, carried out of the company's warehouse before the flames could reach them. The plant was valued at $4,000, and the material and stock on hand is estimated to have been worth from $6,000 to $8,000. The insurance is slight.

General Industrial Notes:—

The James L. Haven Co., Cincinnatia, O., have the contract for one of their hydraulic passenger elevators, for the new addition to the St. Nicholas Hotel, on 4th street, Cincinnati.

The malleable iron works, at Chattanooga, Tenn., have started up. The works have been in course of construction for nearly a year, cost about $75,000, and will give employment to 100 men.

Sealed proposals will be received at the office of the Custodian until 2 o'clock P. M, on the 20th day of June, 1891, for all the labor and materials required for the miscellaneous alterations and repairs to the U. S. Custom House, etc, building, at Cleveland, O.

The Midvale Steel Works, of Nicetown, have secured the right to manufacture the Holtzer armor-piercing proctile in this country. The company has just received a $1,000,000 contract to supply the Government with gun forgings and armor-piercing projectiles.

The universal plate mill of the Elmira Iron & Steel Rolling Mill Co., at Elmira, N. Y., has been leased for one year by N. D. Doxey, formerly superintendent of the plate and bar mills of that company, and J. F. Bailey, of Philadelphia, together with the engines, machinery, etc., necessary to operate the mill. Operations will begin in about three weeks with a force of 75 men, and the mill will run night and day.

The New York Central Iron Works Co. have just shipped another of their famous Dunning steam heating boilers to Wiesbaden, Germany, where they have been in use for a long time, and have given the best of satisfaction. The company anticipate a larger foreign trade than ever this season. The superior merits of their heaters are too well known in this country for special mention. They are also in receipt of an order from Georgia for a large tubular boiler which they expect to ship at an early day.—[Geneva (N. Y.) Gazette June 5, '91.

The Penberthy Injector Co., Detroit, Mich., write us that their business has increased at the rate of 50 per cent. each year since 1887, and has kept up that average so far in this year. They are continually adding new machinery and lathes to their machinery department, and have not since commencing business been able to accumulate any stock ahead. Their output averages about 1,200 injectors per month. This company has acquired a reputation over all of the country for turning out first class work, and when they once get a customer they never lose him.

Probably the largest casting ever transported by the Pennsylvania Railroad Co., arrived at Johnstown on the 23d ult., and was consigned to the Cambria Iron Co. It was a half section of a fly wheel, and weighed 90,000 pounds. The wheel is in halves, bolted together, and when complete is 25 feet in diameter, with a rim 18 inches thick and 28 inches wide. It is for the new 26 inch billet mill now being erected by the Cambria Iron Co. The engine which will drive this wheel is a compound condensing one of 3,000 horse-power, and is being built by the Southwark Foundry & Machine Co., of Philadelphia, which concern also made the fly wheel.

Few people who paint their roofs stop to consider as fully as they should the paint they use. The market is full of poor and cheap paints that have nothing to recommend them except a well-written circular of what they will do—not what they have done. Standing almost, if not entirely, alone in this respect is Dixon's silica-graphite paint. It resists all changes of temperature and all chemical action, and water gathered from roofs will be perfectly pure. This paint has been in the market over 20 years, and experience has shown beyond question that one pound of it has from two to three times the covering power of any other paint. One gentleman wrote to the company: "It has been on my tin roof 13 years, and is apparently as good as ever." Another one wrote: "I have several properties that have been painted from five to six years, with no evidence that they need repainting." The Trenton City Bridge Co. used it on their iron bridge, 1,275 feet long, across the Delaware river, at Trenton, N. J, and from their experience with it, believe the bridge will not need repainting for ten years. All who are interested in roof, iron, fence or bridge painting, should write to the Jos. Dixon Crucible Co, Jersey City, N. J., for further information.

The new plant of the Ball & Wood Co., at Elizabethport, promises to be a model in equipment and convenience for building the improved Ball automatic cut-off engines, with a stretch of 900 feet between the main tracks of the Central Railroad of N. J, and Trumbull street, with the Singer Park at one end and the railroad station at the other, it is an ideal manufacturing site. Two railroad sidings will serve, one the main machine shop into which it passes, and the other the foundry, which at present is in contemplation. From the City Hall in New York to the factory station is exactly ten miles, and a long-distance telephone will connect these points, placing purchasers of engines in instant communication with the source of supply. In the main machine shop even a wide-awake engineer will be impressed with the mechanical progress made in the last decade. A glance will embrace an enormous room, light and airy, 70 feet high to the roof, and flanked with wide and substantial galleries, sustained by iron columns. Overhead a Shaw electric crane will noiselessly raise a completed compound engine of 20 tons from the testing block, carry it the length of the shop, and place it on a car in readiness for shipment. On either hand are new and massive tools, the latest product of shops both East and West, and throughout the entire establishment an air and order of system prevails, which, in itself, will guarantee substantial and excellent work. It is the intention of the company to increase its plant by adding in length when it becomes necessary, and this can be done without interrupting the work in progress. A number of orders for the improved Ball engines are already entered, and in another month the factory will be a busy scene, well worth the inspection of engineers as well as purchasers of this well-known engine.

The Manufacturing Census of 1890.

Superintendent of the Census, Robert P. Porter, in a recent interview, said: "The last decade has added about 3,000,000 to our inhabitants, a population almost equivalent to that of Belgium, Holland and Portugal combined. This population has spread itself over 377,000 square miles of solitude, or more than three times the area of the United Kingdom of Great Britain and Ireland."

He said that the gross value of our manufactured products during 1890 would probably be $8,600,000,000, an increase of about $3,300,000,000. The capital invested will probably reach $4,600,000,000, and the increase during this decade exceeds the total capital invested in 1870. The wages paid will be close upon $1,500,000,000, an addition of $500,000,000, or $50,000,000 annually. The number of hands employed will be about 3,650,000, an addition to our army of wage earners of 900,000 during the decade. The mining products have almost doubled this decade, and the lumber interests have also increased enormously and the product for 1890 will not fall far short of $500,000,000, which exceeds by over 100 per cent. the total product returned by the tenth census.

THE largest manufacturing company in England is that of Bolckow, Vaughan & Co. Their chief products for the last year amounted to 1,877,694 tons of coal, 597,056 tons of coke, 1,877,694 tons of iron ore, 478,749 tons of pig iron and 194,077 tons of finished steel. The company employs a force of 13,075 workmen, and their annual pay-roll shows the figures $4,500,000.

From End to End.
The entire length of the line, tickets will be sold at one fare for the round trip, July 2d, 3d and 4th, between any two stations on the Nickel Plate.

Excursion to Ft. Wayne, Ind,
Via Nickel Plate, June 23d to 26th. Knights of St. John Annual Convention. Returning until June 29th, 1891. Go via Nickel Plate.

A Chance for All
To travel at one fare for the round trip, will be given by the Nickel Plate, July 2d, 3d and 4th, returning July 7th, 1891.

Convention of Knights of St. John
At Ft. Wayne, Ind. Go via Nickel Plate at special reduced rates, June 23 to 26. Returning until June 29th, inclusive.

"Quick-Laid" Steel Roofing.
(Roofing and Packages Patented)
EVERY ROLL COMPLETE.
DEALERS
Find This
ROOFING
JUST WHAT
Their Trade Requires.

Does away with labor required by others; makes Roofing profitable; has no exposed Nails, Rivets or Cleats; is packed in Patent packages, which protect it in shipping. It pleases all who use it.
—MANUFACTURED BY—
HEBERLING METAL ROOFING CO., - - HAVANA, ILL.

DIXON'S
GRAPHITE
PAINT

THOSE who use it say that one pound will cover 2 to 3 times more surface and last 4 to 5 times longer than any lead, mineral or metallic paint. A tin or iron roof well painted will not require repainting for 10 to 15 years.
JOS. DIXON CRUCIBLE CO.,
Jersey City, N. J.

PERFORATED METALS OF EVERY DESCRIPTION BY THE HARRINGTON & KING PERFORATING CO. CHICAGO.

284 Pearl St., cor. Beekman. NEW YORK.

Plate Iron Washers

A SPECIALTY!

Even in Guage, smooth and well finished.

Cut from new plate, rolled expressly for the purpose. Write for prices, Address,

MILTON MFG. CO., Milton, Pa.

SAMPLES & PRICES ON APPLICATION

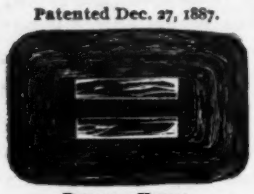
ALUMINOUS METAL ROOFING, EAVE TROUGHS, CONDUCTOR PIPES, VALLEYS, SHINGLES &

NON-CORROSIVE SUPERIOR TO COPPER AT PRICE OF TIN. SOLE MFGRS.

REQUIRES NO PAINT FOR PROTECTION — STAN-ALUMIN METAL CO., CANTON-O.

It is not a Dead, but a Live Elastic Packing.

Patented Dec. 27, 1887.



BEFORE USING.

That will pack a Steam, Water, Oil, Air or Ammonia Rod, also a Smooth, Fluted, Out-of-Round or Vibrating Rod, an Engine, Pump, Ice Machine, Air Compressor, Steam Hammer, Rotary Rod, or any rod that has to be packed, and keep it tight without pressure or friction, as it works automatically.

We will prove this by yourself. If you will send for enough to pack a rod, we will send it on 30 days' trial, and prove to you that the "Sensible" Automatic Packing is the "Best" made, therefore is "Cheapest."

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SOLE MAKERS:

Sensible Automatic Packing Co., 63 So. Canal St., Chicago, Ill.

PORTBLE, HAND OR BELT **PIPE CUTTING & THREADING MACHINE.**

Double Application of Power. Double Leader Screw Instantly Changeable, range from 1 to 6 in. Pipe.

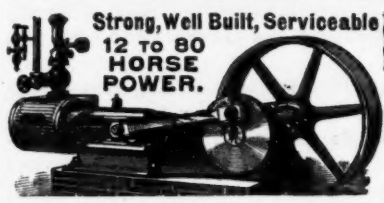
Write for Description and Prices

WELLS MACHINE WORKS, FOSTORIA, O.

THE **ROBERT AITCHISON PERFORATED METAL CO.** CHICAGO, ILL.

OFFICE 510---265 to 269 DEARBORN ST.

WORKS AT SOUTH CHICAGO.



Strong, Well Built, Serviceable 12 TO 80 HORSE POWER.

STEAM ENGINES

ADAPTED TO HEAVY, CONTINUOUS WORK.

EVERY ENGINE TESTED UNDER FULL LOAD.

Suitable **BOILERS** on hand for immediate delivery

FOR DESCRIPTIVE CIRCULARS ADDRESS

CHANDLER & TAYLOR CO., INDIANAPOLIS, IND.

CLEVELAND **GALVANIZING WORKS.**

H. H. HODELL & CO.,

Galvanizing in all its branches, and Manufacturers of Rubber Buckets for chain pumps.

CLEVELAND, OHIO.

FRANK & CO., BUFFALO, N. Y.

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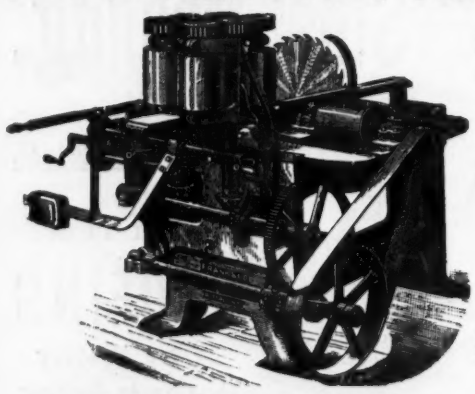

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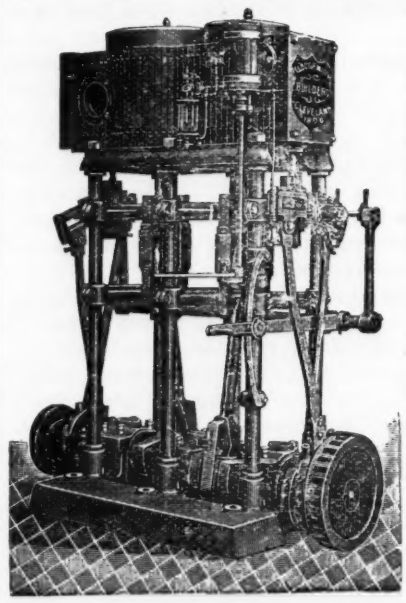
WOOD WORKING MACHINERY.

COMPOUND AND MARINE ENGINES.



HIGH PRESSURE, STEEPLE AND FORE AND AFT **COMPOUNDS.**

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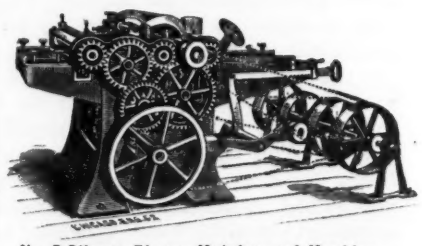
CLOUGH, WITT & CO.,

CLEVELAND, OHIO.

Wood - Working Machinery

OF EVERY DESCRIPTION.



No. 2 Clipper Planer, Matcher and Moulder.

When in want of an A 1 Planer and Matcher, Surfacer, Hand Planer, Shaper, Moulder, Mortiser, Tenoner, Band Saw, Scroll Saw, Gang Edger, Rip Saw, Cross Cut or Swing Saw, in fact any Wood-Working Machinery, write for our special prices and catalogue.

INDIANA MACHINE WORKS,

FORT WAYNE. IND.

STEEL CASTINGS

FROM 1-4 TO 15,000 LBS. WEIGHT.

True to pattern, sound, solid, free from blow-holes and of unequaled strength.

Stronger and more durable than iron forgings in any position, or for any service whatever.

60,000 CRANK SHAFTS and 50,000 GEAR WHEELS of this steel now running prove this.

Crossheads, Rockers, Piston-Heads, etc., for Locomotives. STEEL CASTINGS of every description.

Send for circulars and prices to

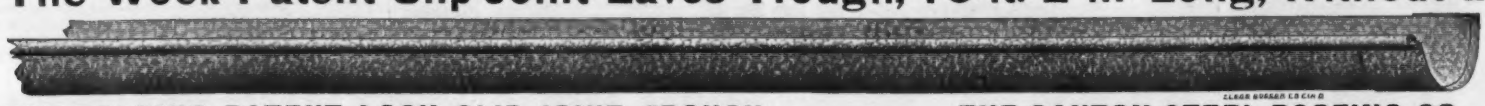
Chester Steel Castings Co.,

WORKS: CHESTER, PA. OFFICE 407 LIBRARY ST., PHIADELPHIA, PA.

DON'T USE poor printing when you can get the best at the same prices, of the CLEVELAND PRINTING & PUBLISHING CO., Cleveland, O.

ONE OF DUNN'S HOISTING MACHINES with over 6 feet of chain. Good as new capacity, 600 lbs. Address Dunn, care Iron Trade Review, Cleveland, O.

The Wock Patent Slip Joint Eaves Trough, 10 ft. 2 in. Long, Without a Seam.



Steel and Wire Hangers, Etc.

THE BELDING PATENT LOCK SLIP JOINT TROUGH, Manufactured by **THE CANTON STEEL ROOFING CO., Canton, O.**

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, net cash) Bessemer, $17 30; No. 1 Foundry, $16 80; No. 2 Foundry, $15 80; No. 1 Gray Forge, red short, $14 80; No. 2 Gray Forge, neutral, $14 30; No. 1 American Scotch, $16 80; No. 2 American Scotch, $15 80.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1 foundry, $16 25@17 00; Southern Coke No. 2 Foundry, $15 25@16 00; Southern Coke No. 3 Foundry, $15 00@15 75; Southern Coke No 1, Softeners, $15 25@16 00; Southern Coke No. 2, Softeners, $14 50@15 25; Ohio Silveries No. 1, $17 75@18 75; Ohio Silveries No. 2, $16 75@ 17 75; Ohio Strong Softeners No. 1, $18 00@19 00; Ohio Strong Softeners No. 2, $17 25@18 25; Lake Superior Charcoal Nos. 1 to 6, $17 75@18 50; Tennessee Charcoal No. 1, $18 00@19 00; Tennessee Charcoal No. 2, $17 00@18 00; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 00@15 25; Hanging Rock Coke, No. 1 foundry, $16 50@17 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $16 50@17 50; Hanging Rock Charcoal, No. 1 foundry, $20 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $12 75@13 25; Standard Southern Coke, mottled, $12 50@12 75; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $19 50@20 50; Tennessee Car Wheel, $18 00@19 00; Lake Superior Car Wheel $19 50@20 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $17 00@00 00; Mahoning and Shenango Valley strong, No. 2 Foundry, $16 00@00 00; Ohio Softener No. 1, $17 00@00 00; Ohio Softener No. 2, $16 00@00 00; Jackson Co., Silvery No. 1, $18 25@00 00; Jackson Co. Silvery, No. 2, $17 25@00 00; Lake Superior Charcoal, $18 50@00 00; Tennessee Charcoal, $18 50@00 00; Southern Softener No. 1, $16 25@00 00; Southern Softener No. 2, $15 50@00 00; Southern Strong No. 1 Foundry, $17 00@00 00; Southern Strong No. 2 Foundry, $16 25@00 00; Alabama Car Wheel, $22 00@22 50; Hanging Rock Charcoal, $23 00@24 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 25@14 50; Southern coke No. 2, $13 75@14 00; Southern coke No. 3, $13 25@13 50; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 50@17 00; Southern charcoal, No. 2, $16 00@16 50; Missouri charcoal, No. 1, $17 00@17 50; Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@13 00; Cold short, $12 50@13 00; Mottled, $12 00@12 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $19 50@20 00; Southern (other brands), $17 50@18 00; Lake Superior, $20 50@21 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@15 75; Southern Coke No. 2, $14 75@15 00; Southern Coke No. 3, $14 00@14 25; Southern Grey Forge, $13 50@13 75; Southern Charcoal No. 1, $17 75@18 00; Southern Charcoal No. 2, $17 25@17 50; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $20 00@20 50; Southern, $19 00@21 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $0 00.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $18 00@18 50; Lake Superior (coke) Bessemer, $18 00@18 50; Katahdin (Maine charcoal), $00 00@00 00; Lake Superior Coke, Foundry, all ore, $18 00@18 50; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $18 00@18 50; Southern No. 1 $16 25@16 50; Southern Gray Forge, $14 00@14 50; Jackson County (Ohio) Silvery, $18 00@18 50; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0.00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 50@15 00; Southern Coke No. 2 Foundry $13 75@14 25; Southern Coke No. 3 Foundry $13 25@13 75; Grey Forge, $12 75@13 25; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $16 00@17 00; Car Wheel, $17 00@20 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $16 00@16 25; No. 2 Foundry, $15 00@16 25; Grey Forge, $14 00@14 25; White and Motfled, $13 00@13 50; Warm Blast Charcoal, $18 00@20 00; Cold Blast Charcoal, $22 00@27 00; Bessemer, $15 75@16 00.

MERCHANT IRON AND STEEL.

Flat Bar

1½ to 4 by ⅜ to 1 inch	1 80
4½ to 6 by ⅜ to 1 inch	1 90
1½ to 6 by 1¼ to 2 inch	2 20
1¼ & 1½ by ⅜ to ¼ inch	1 90
1 & 1¼ by ⅜ to ¼ inch	2 00
⅝, ¾ and ⅞ by ⅜ to ½ inch	2 20

Round and Square.

1 to 1⅜ inch	1 80
2 to 2¼ inch	2 00
2¼ to 3¼ inch	2 30
3¼ to 4 inch	2 80
4¼ to 4½ inch	3 30
4¾ to 5 inch	3 50

Oval.

⅜ to 1¼ inch	2 20
½ to ¾ inch	2 40
⅝	2 60
¾	3 00

Half Oval and Half Round.

1¼ to 3 inch	2 90
⅝ to 1¼ inch	2 50
½ to ¾ inch	3 10
⅝	3 30
¾	4 80

Heavy Band.

¼ to 6 by ¼ and 5-16 inch	2 00
¼ to 1¾ by ¼ and 5-16 inch	2 10
⅜ to ⅞ by ¼ and 5-16 inch	2 30
to ⅞ by ½ and 5-16 inch	3 80

Hoops.

1¼ to 4, Nos. 13 to 15	2 60
1¼ to 2, Nos. 16 to 18	2 70
1¼ to 2, No. 19	2 80
1¼ to 2, No. 20	2 90
1¼ to 2, No. 21	3 00
1¼ to 2, No. 22	3 10
15-16, 1 and 1⅛, Nos. 13 to 15	2 80
15-16, 1 and 1⅛, Nos. 16 to 18	2 90
15-16, 1 and 1⅛, Nos. 19 and 20	3 00
15-16, 1 and 1⅛, No. 21	3 10
15-16, 1 and 1⅛, No. 22	3 20
⅞, Nos. 13 to 15	3 00
⅞, Nos. 16 to 18	3 10
⅞, Nos. 19 and 20	3 20
⅞, No. 21	3 30
⅞, No. 22	3 40
13-16, Nos. 13 to 15	3 20
13-16, Nos. 16 to 18	3 30
13-16, Nos. 19 and 20	3 40
13-16, No. 21	3 50
13-16, No. 22	3 60
¾, Nos. 13 to 15	3 30
¾, Nos. 16 to 18	3 50
¾, Nos. 19 and 20	3 60
¾, No. 21	3 70
¾, No. 22	3 80
11-16, Nos. 13 to 15	3 50
11-16, Nos. 16 to 18	3 70
11-16, Nos. 19 and 20	3 80
11-16, No. 21	3 90
11-16, No. 22	4 00
⅝, Nos. 13 to 15	3 80
⅝, Nos. 16 to 18	4 00
⅝, Nos. 19 and 20	4 10
⅝, No. 21	4 20
⅝, No. 22	4 30
⅝, No. 23	4 50

Light Band.

1¼ to 6 by ¼ to 3-16 in	2 20
1¼ to 6 by Nos. 11 and 12	2 30
1 to 1¾ by ¼ to 3-16 in	2 40
1 to 1¾ by Nos. 11 and 12	2 50
⅞ and 13-16 by ¼ to 3-16 in	2 70
⅞ and 1 3-16 by Nos. 11 and 12	2 80
¾ and 11-16 by ¼ to 3-16 in	3 00
¾ and 11-16 by Nos. 11 and 12	3 10
⅝ and 9-16 by ¼ to 3-16 in	3 30
⅝ and 9-16 by Nos. 11 and 12	3 40
½ by ⅜ to 3-16 in	3 60
½ by Nos. 11 and 12	3 70

Wagon Box Iron.

⅜ inch, beveled edge, by Nos. 11 and 12	2 80
⅜ inch, " " " 13 and 14	3 00
½ inch, " " " 11 and 12	3 10
½ inch, " " " 13 and 14	3 30

Sheet Iron:

No. 10 to 14	2 65
No. 15 to 17	2 75
No. 18 to 21	2 99
No. 22 to 24	3 15
No. 25 to 26	3 30
No. 27	3 40
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 60
C No. 1, " "	2 85
C H No. 1 " "	3 10
C H Flange, " "	3 85
Extra Flange, "	4 35
Solid Fire Box "	5 10

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 75
Shell	3 15
Flange	3 45
Marine Flange	3 85
Fire Box	4 55

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1¼c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅜ and 2¾ to 3 in	10½
3¼ to 4 in	11
⅜ to 11-16 and 4½	10½
⅛ to 6 in	11½
¼ to 9-32 and 6½ to 7 in	12
3-6 in	14

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅛ thick	9

Bessemer and O. H. Steel.

Machinery	base price,	2 75
Tire	"	2 75
Spring	"	3 25
Sleigh Shoe	"	2 75
Toe Calk	"	3 00
Cutter Shoes, tapered and burr.	"	3 00

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, 3/16, 11-16 and ¼ inches diameter	4 00
Bridge ⅛, 3/16, 11-16 and ¼ inch diam	4 00

SCRAP IRON AND OLD METAL.

NET TONS	
No. 1 R. R. wrought scrap	$19 00
No. 1 wrought scrap	17 00
No. 1 Machine cast scrap	12 00
Iron axles	24 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
Cast borings	8 00
Uncut wrought iron boilers	11 00
Steel boiler plates	17 00
Grate Bars	8 00
Pipes and flues (Clean)	13 50
Tank iron	13 50
Hoop and band iron	10 00
Sheet iron	9 50
Wrought drillings	11 00
Malleable iron	10 00

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

CLEVELAND ROLLING MILL CO.,

MANUFACTURERS OF

BESSEMER STEEL RAILS,

Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel, Steel Street Rails, Steel Oil Barrel Hoops, Wire of all Kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

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MANUFACTURERS OF

SHEET IRON AND SHEET STEEL

Squared Roofing Sheets a Specialty.

CAMBRIDGE REFINED IRON. TRADE MARK

CAPACITY RANGES FROM No 30 26 INCHES WIDE TO 1-4×40×120

CAMBRIDGE SOFT STEEL. TRADE MARK

CORRESPONDENCE SOLICITED

OFFICE AND WORKS CAMBRIDGE, OHIO.

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Ball-Norton (Monarch) Electro Magnetic Separator.

Phosphorus, sulphur, silica, hornblende and other impurities eliminated from Iron Ore, and non-Bessemer ore converted into Bessemer Ore. Samples treated without charge. Correspondence solicited.

H. E. COLLINS & CO., Agents Magnetic Separator Co.,

BANK OF COMMERCE BUILDING, PITTSBURGH, PA. ALDRICH COURT, 45 BROADWAY, NEW YORK

DALLIBA, CORRIGAN & CO.,

DEALERS IN

Iron Ore & Pig Iron,

Rooms 716, 717, 718, 719 Perry-Payne Bld'g.

CLEVELAND, O.

OGLEBAY, NORTON & CO.,

Successors to Tuttle, Ogiebay & Co.,

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FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS,

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J. H. OUTHWAITE & CO.,

Exclusive attention given to

LAKE SUPERIOR AND MENOMINEE RANGE

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AND METALS.

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Dealers in Iron Ores

from their own mines near Marquette, Lake Superior.

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MINERS AND SHIPPERS OF

Ohio Steam Coal and Coke.

Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 3,000 tons daily.

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Lake Shipping Point, Lorain O

JAS. PATTERSON, Sales Agent.

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Cleveland, O., U. S. A

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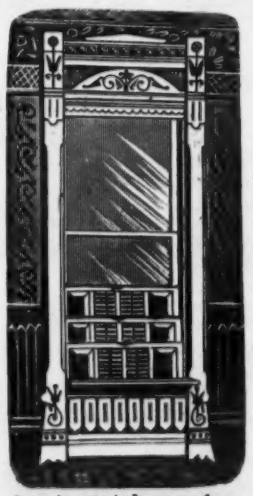

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HARTMAN & DURSTINE, No. 59 Beaver St. Wooster, O.

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 12

Bellows.

Blacksmiths' { Hill's.....dis 40
Bullock's.....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard.dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shults Raw Hide Leather Belting, double and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 12

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¼".....dis 50&10
Morse Taper and Straight shank Larger than 1¼".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to No. 54 46 gr.	150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
¼ kegs ₩ lb	4½c	5½c		2¾c
½ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	⅜	5-16	⅜	½	⅝	¾	1
Square	8	7	5¾	4¾	4	3⅜	3⅛
Hexagon	15¾	11⅝	8¾	6	5¾	5⅛	5
Washers	9	8	7	5	4¾	4⅜	4⅛

In lots less than 100 lbs, ₩ lb add ½c., lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 { Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $5.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 15¾
Sisal, ½ inch and over.....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" Band.....dis 10
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws.dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts.dis 25c "
" One-man Cross-cuts.....dis 33c "
No. 1 Handles.....dis 25c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Couch, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls		21c@29c
No. 18 " " ¼ and ½ "		18c@28c
No. 36 " " ¼ and ½ "		16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine 11¼c		
3-Ply " 1 lb Balls		12@12½c
3-Ply " 1½ lb Balls		11@11¼c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 25

Wire.

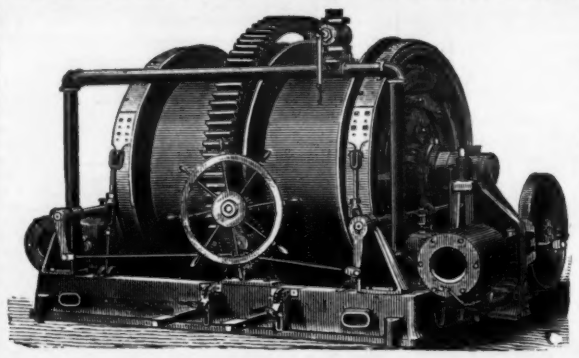
New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75&5
" " Nos. 27@36..dis 75&10&5
Coppered Nos. 0 to 18, market list..dis 70@70&5
Galvanized Nos. 0 to 18 " ".....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 5

Wrenches.

Coe's genuine,.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 5
Bemis & Call's Combination.....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis 50

Webster, Camp & Lane Machine Co.



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Mining Machinery,

Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

Wire Rope Haulage Machinery,

(Endless or Tail Rope Systems.)

CORNISH PLUNGER AND BUCKET LIFT PUMPS.

Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.

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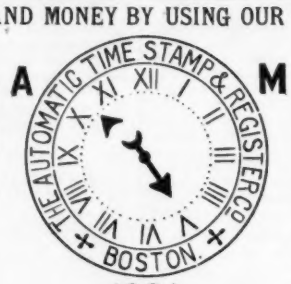
SAVE TIME AND MONEY BY USING OUR SPECIALTIES.

OUR **Time Stamps**

Mark the hour and minute, the day, month and year, by one impression.

Useful, Economical, Ornamental.

PRINTED MATTER ON APPLICATION.



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Record the hour and minute of the arrival and departure of employes by their own act, in their own handwriting.

Indispensable for employers and just to employes.

THE AUTOMATIC TIME STAMP AND REGISTER COMPANY

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THE THOS. D. WEST FOUNDRY. CO.
CLEVELAND. O.
LIGHT AND HEAVY
IRON CASTINGS.
DAILY MELTING CAPACITY 75 TONS-SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.
DUPLICATE WORK A SPECIALTY

F. A. SACKMANN,
125 Champlain, Cleveland, O.
STEEL ALPHABETS
STEEL NAME STAMPS
BURNING BRANDS
Steel Name Stamps (1-16, 3-32 or ¼ inch letters, 15c. per letter

Detachable Roller and Chain Belting,

MADE IN ALL SIZES OF

Malleable Iron and Steel,

DESIGNED FOR

Elevators, Conveyors, Drive Belts, etc.

For handling materials of all kinds.

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Unequaled for ROOFING AND SIDING.

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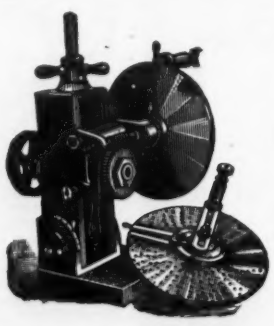

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Amateurs, Clock Makers, Model Makers, Knitting Machine Makers, Tool Makers,

Or any one having use for SMALL GEARING.

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CANTON IRON FOUNDRY CO.,
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HEAVY AND LIGHT CASTINGS.
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THE BRIGHTMAN STOKER IS THE BEST
STEAM BOILER FURNACE IN THE WORLD.
SEND FOR DESCRIPTIVE PAMPHLET. THE BRIGHTMAN STOKER Co. 201-203 RIVER ST. CLEVELAND, OHIO.

HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₩ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₩ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....₩ doz $7 00
Others.....₩ doz $6 00
Full polished.....₩ doz $8 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 75&10
Tire, common, new list.....dis 65
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&10
Loose joint, jap.....dis 70&10
Loose joint, jap. with acorns.....dis 70&10
Loose pin, acorns.....dis 70&10
Loose pin, japanned acorns.....dis 70&10
Loose pin, acorns, jap. plated tips.....dis 70&10
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10
Wrought, fast joint, broad.....dis 70&10
Wrought, loose joint, broad.....dis 70&10
Table Butts, back flaps, etc.....dis 70&10
Regular inside blind.....dis 70&10
Light inside blind.....dis 70&10
Loose pin.....dis 70&10
Light loose pin.....dis 70&10

Carbonized Felt and Building Papers.

(POWERVILLE BRAND.)

	Per roll of 500 sq. feet.
Kberts Bros., Detroit.	
No. 1—Slaters'.....	$1.25
"A," Stringed Roofing, Light.....	1.50
"B," Stringed Roofing, Medium.....	1.75
"C" Stringed Roofing, Heavy.....	2.00
Stringed, Rosin-Sized.....	1.00

MILCELLANEOUS.

Asphaltum, Trinidad Refined, ₩ ton.....	$30.00
Asphaltum, Fine Grade, ₩ lb.....	.08
Coal Tar Felt, 1 Ply, ₩ lb.....	.02
Coal Tar Felt, 2 Ply, ₩ roll 108 sq ft.....	1.42½
Coal Tar Felt, 3 Ply, ₩ roll 108 sq ft.....	1.85
Roofing Pitch, ₩ gal.....	.09

Chains.

Revised List.

Trace, 6¼-10-2.....₩ pair 1.03
Trace, 6¼-10-3.....₩ pair .92 .....50&10
Trace, 7-10-2.....₩ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....₩ lb 5½@6
Jack Chain, Iron.....dis 75&10
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	3.	3X.
Pails, water, 12 qt.....	$4 00	$4 50	$.....
Dairy, 14 qt.....	4 50	5 00	.....
Fire 12 qt.....	5 00	.....	.....
Sugar.....	6 00	6 50	.....
Horse.....	.....	5 00	.....
Buggy.....	4 00	.....	.....
Chamber, Slop, Commode } 3 and 3X 14 qt.....	6 50	7 50	8 50
Urns, slop, 3 and 3X 14 qt.....	8 00	9 00	10 00
Basins, wash—			
10½ inch.....	2 00	2 25	.....
12 inch.....	2 25	2 75	3 25
13½ inch.....	2 75	3 25	3 75
15 inch.....	3 25	3 75	4 25
Bowls, fruit.....	.....	2 50	.....
Servers, 12 in.....	.....	2 25	.....
Baskets, waste paper, 13 in.....	.....	6 00	.....
Spittons, "Daisy," pressed 8 inch.....	4 00	4 50	5 00
10 and 11¼ inch.....	6 00	6 50	7 50

No. 1 plain; No. 3 decorated; No. 3X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₩ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 55
Scranton.....dis 33—
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

No.	10	9	8	7	6	
Ausable, ₩ lb..	23	24	25	26	28	dis 40
Putnam, ₩ lb..	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....₩ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₩ keg $4 00
Mule Shoes, at factory.....₩ keg $5 00

Knobs.

Carriage, japanned.....₩ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hemacite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60&10
Escutcheons and keys.....dis 60&10
Padlocks and padlock keys.....dis 75
Bell pulls, mineral, porcelain and jet dis 60&10
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze...dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....₩ gross $4.80

Plumbs and Leve s.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....₩ doz $6 00
Bishop's O K.....₩ doz $5 25
Bishop's Pioneer.....₩ doz $3 75
Bishop's American.....₩ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....₩ gross $15 00

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Hatch, Tea, No. 161.....₩ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

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Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
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Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 77½&10
Steel carpet tacks all kinds.....dis 75&10
Swedes iron carpet tacks, all kinds dis 75&10
Swedes iron tacks.....dis 75&10
Swedes iron Upholsterers' tacks.....dis 75&10
Tinned Swedes iron tacks.....dis 77½&10
Tinned Swedes iron Upholsterers' tacks.....dis 77½&10
American iron cut tacks.....dis 77½&10
Copper tacks.....dis 40&10
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 50&10
Finishing nails.....dis 60&10
Hungarian nails and miners' tacks..dis 60&10
Gimp and lace tacks.....dis 77½&10
" " " tinned.....dis 60&10
Trunk and clout nails.....dis 72½&10
Tinned trunk&clout nails.....dis 66&10
Basket nails.....dis 66&10
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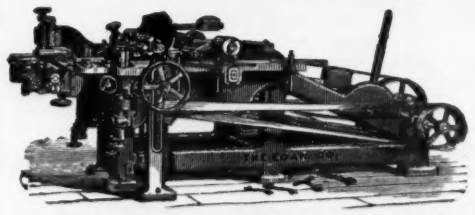

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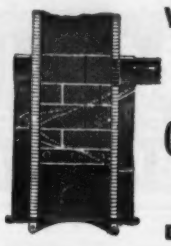

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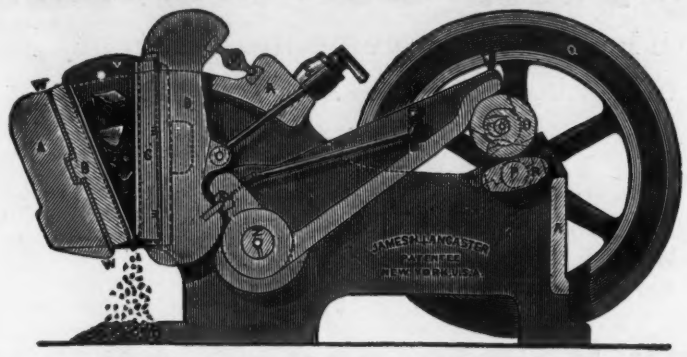

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N. Y. & Pitts. Express.....	‡5 58 a m	*8 25 a m
Fast N. Y. & Pitts. Express*	10 55 a m	*3 00 p m
Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom.....		†4 30 p m
Pittsburgh Express.....	†1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.
(Standard Gauge.)

Depart for—
Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.
Arrive from—
Zanesville and Coshocton—10:30 a. m.,6:30 p m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.
Trains marked * run daily.

Valley Railway.

FOR AKRON, CANTON AND MARIETTA.
Depot oot South Water Street.

	Depart.	Arrive.
Valley Junction Mail.....	*7 25 a m	*6 40 p m
Marietta Express.....	†11 15 a m	†2 35 p m
Balto. & Wash. Express....	*4 00 p m	*10 25 a m
Cleve. and Canton Express	†6 30 p m	†8 15 a m

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	Depart.	Arrive.
For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	7 45 a m	d5 25 a m
	1 15 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.....	3 25 p m	10 10 a m
Ravenna Accom.....	5 00 p m	8 25 a m

d Daily. * Except Saturday. Other trains except Sunday.

From Cleveland Union Station.

Mt Vernon and Pan Handle Route

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus, Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest.	8 00 a m	d 7 00 am
	d 8 00 p m	5 40 p m
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus.	1 15 p m	12 50 p m
For Cuyahoga Falls, Akron, Orrville, Chicago, and all points in the West and Northwest.	8 00 a m	5 40 p m
	3 25 p m	10 10 a m

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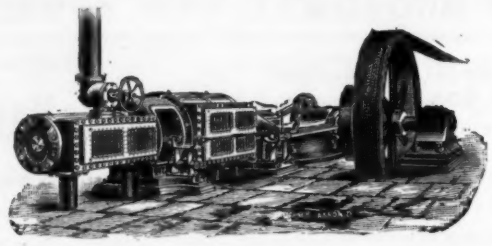

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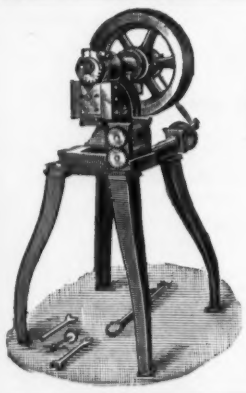

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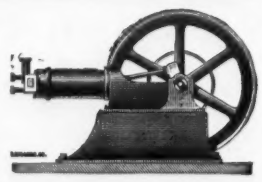

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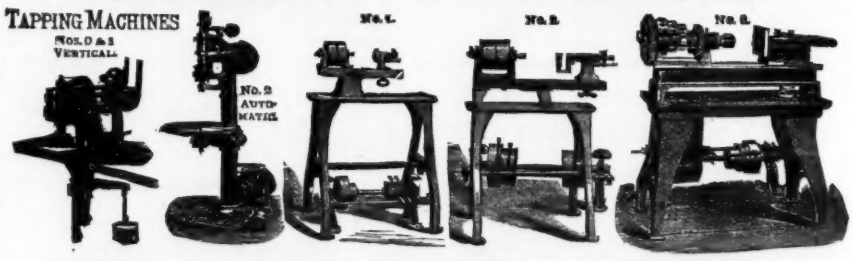

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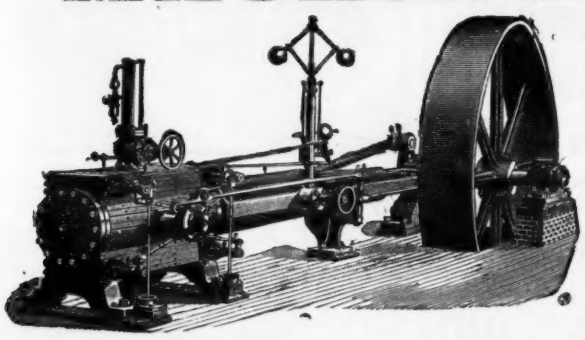

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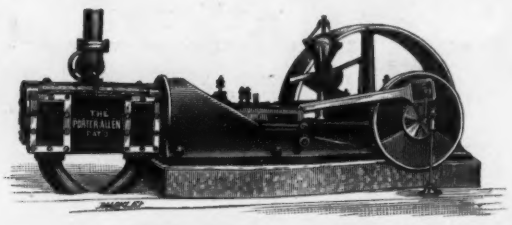

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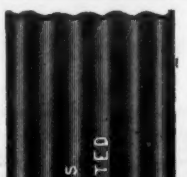

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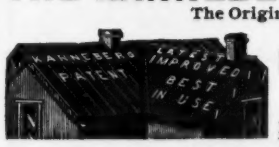

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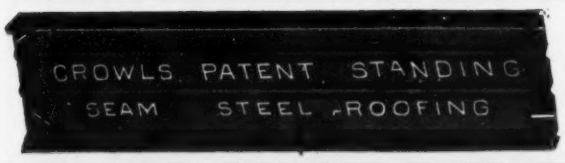

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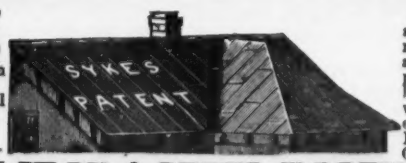

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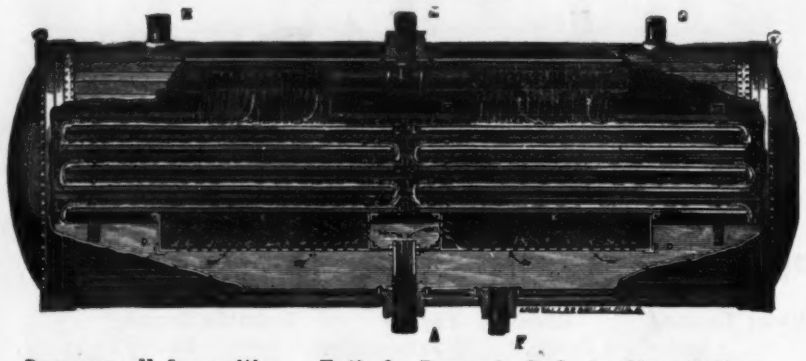

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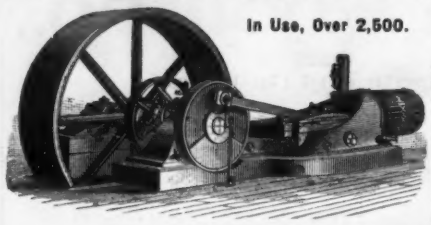

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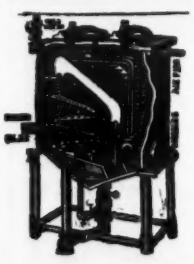

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